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FLOW BOILING WITH ENHANCEMENT DEVICES FOR COLD PLATE COOLANT CHANNEL DESIGN

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ABSTRACT

A multi-year research effort is underway to study the effect of enhancement devices on flow boiling heat transfer in horizontal coolant channels, which are heated from the top side. The use of flow boiling, rather than the more conventional technique of thermal capillarity, for thermal energy transport is intended to provide an alternative for accommodating higher heat fluxes in commercial space systems. The objectives of this year's work are to: (1) examine the variations in both the mean and local (axial, and circumferential) heat transfer coefficients for a circular coolant channel with either smooth walls, spiral fins, or both spiral fins and a twisted tape, (2) examine the effects of channel diameter and subcooling, and (3) develop an improved data reduction analysis and/or suggest possible heat transfer correlation for the present data. Although other fluids will be studied in future years, freon-11 is the working fluid for this study.

Two-dimensional (circumferential and axial) wall temperature distributions have been measured for coolant channels with the above noted internal geometries. The flow regimes which are being studied are: (1) single phase, (2) subcooled flow boiling, and (3) stratified flow boiling. The inside diameter of all test sections is near 1.0 cm. Circumferentially averaged heat transfer coefficients at several axial locations have also been obtained for selected coolant channels for a mass velocity of 210 kg/m^{2}s, an exit pressure of 0.19 MPa (absolute), and an inlet subcooling of 20.8°C. Overall (averaged over the entire channel) heat transfer coefficients were compared for the above channel geometries. This comparison showed that the channel with large pitch spiral fins had higher heat transfer coefficients at all power levels. However, the results appear to indicate that if the twist ratio (ratio of the twisted tape period to the inside diameter) was decreased, the enhancement technique employing both fins and a twisted tape would probably have greater enhancements. Although the present comparisons are based on equal mass velocity (inlet subcooling and exit pressure), later comparisons will be based on equal pumping power.

NOMENCLATURE

h	Heat transfer coefficient, $W/m^2\ ^\circ C$
h_∞	Mean heat transfer due to natural convection between the test section and the ambient, $W/m^2\ ^\circ C$
q_c	Heat loss from the test section due to convection, W/m^2
q_R	Heat loss from the test section due to radiation, W/m^2
r	Radial coordinate for the data reduction model, m
T_f	Bulk temperature of the flowing fluid, $^\circ C$
T_m	Local measured outside wall temperature of the test section, $^\circ C$
Tsat	Saturation temperature (316 K at 0.19 MPa for freon-11), $^\circ C$
T_∞	Ambient temperature, $^\circ C$
Z, Z_i	Axial coordinate for heated portion of the test section; in the figures Zi represents Z_i, where Z_i=20.32(i-1), cm

Greek Letters

ϕ	Circumferential coordinate; see Figure 5 for the datum. In some figures, ϕ is also referred to as "**Phi.**"
π	Half of a full rotation or 180 degrees; in some figures, π is also referred to as "**Pi.**"

INTRODUCTION

Space commercialization will require efficient heat transfer systems. The future success of many efforts will be based on our understanding of the behavior of two-phase flow boiling in both the space (zero-g or reduced-g) and earth environments. This milti-year program is intended to focus on the following fundamental characteristics of experimental flow boiling heat transfer and pressure drop in the earth environment: (1) non-uniform heat flux distribution, (2) resulting local distributions of the heat transfer coefficient, (3) pressure drop and pumping power, (4) single and double enhancement devices, (5) the relative advantages of saturated and subcooled flow boiling regimes, (6) flow channel aspect ratio effects, (7) the relative effects of heat transfer enhancement techniques, and (8) correlations for mean (and local) heat transfer and pressure. Future research efforts, which will be applicable to several gravitational levels (earth, reduced gravity, and zero-g environments), will include basic phenomena such as: (1) the effect of orientation (vertical flow and bottom-heated flow

channels) and Marangoni effects, (2) flow stability, and (3) identification of the threshold inertia (Froude and modified Froude numbers). Threshold inertia determination is necessary to identify when orientation (earth or reduced-g) and/or Marangoni (at zero-g) effects become important. Although it is not apparent, the development of improved data reduction models is essential to the accurate representation and interpretation of the heat transfer data.

This effort is intended to lead to the development of fundamentally-based heat transfer correlations which include effects of: (1) complex heat flux distributions, (2) enhancement device configuration, and (3) basic flow parameters.

Thus far, this work has directly or indirectly supported four graduate students and two undergraduate students. Two of the graduate students have graduated and a third will be finishing soon. The forth graduate student has just begun his graduate studies, and is presently working on comparitive heat transfer predictions using existing correlations. One of the two undergraduate students has graduated and is now in graduate school at another university. The second undergraduate student is now assisting the PI and working on an aspect of the data reduction analysis.

EXPERIMENTAL INVESTIGATION

Experimental Overview

The descriptions of the experimental flow loop, procedures, and data acquisition have been described in previous work [1,2]. Figures 1 and 2 show both the flow loop and test section configurations, respectively. In our study the effects of enhancement devices on heat transfer in horizontal tubes, several internal tube configurations were used (see Figure 3). An electrical heater tape was used to simulate power generation at the outside surface of the test section. Thermocouples were used to make temperature measurements of the outside wall of the heated coolant channel. Type-K thermocouples were used. Figure 4 is a schematic of the cross section of the heated portion of the test section [which is preceded by an upstream unheated portion for flow development]. Twenty-eight wall temperature measurements, at all power levels, were made. Figure 5 shows the four circumferential locations (ϕ = 0, $\pi/4$, $3\pi/4$, and π radians) for seven different axial locations. The measured wall temperatures were used along with the data reduction analysis to determine the unknown heat transfer coefficient, h.

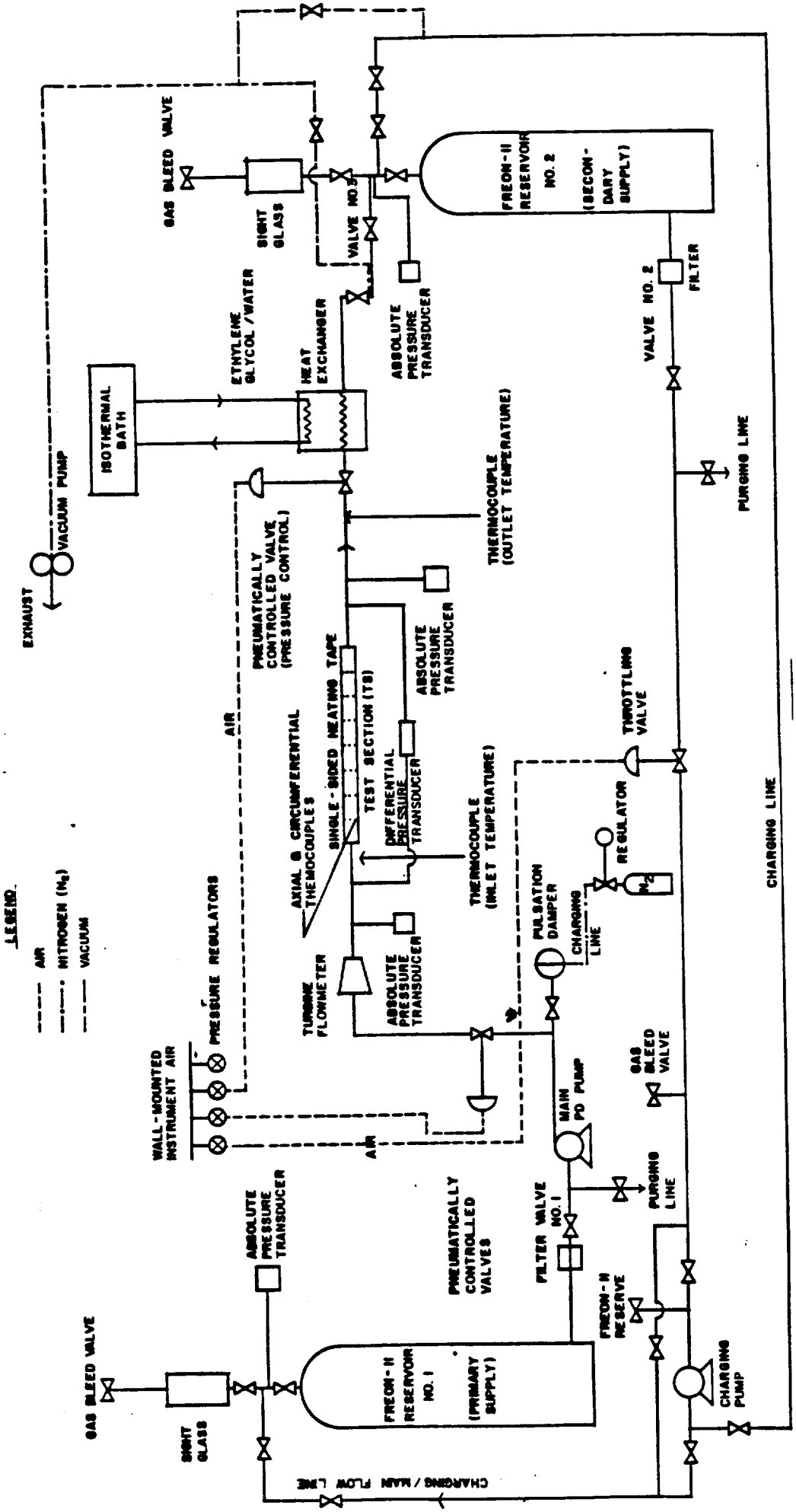

Figure 1: Freon-11 Flow Loop for Both Subcooled and Saturated Flow Boiling Experiments.

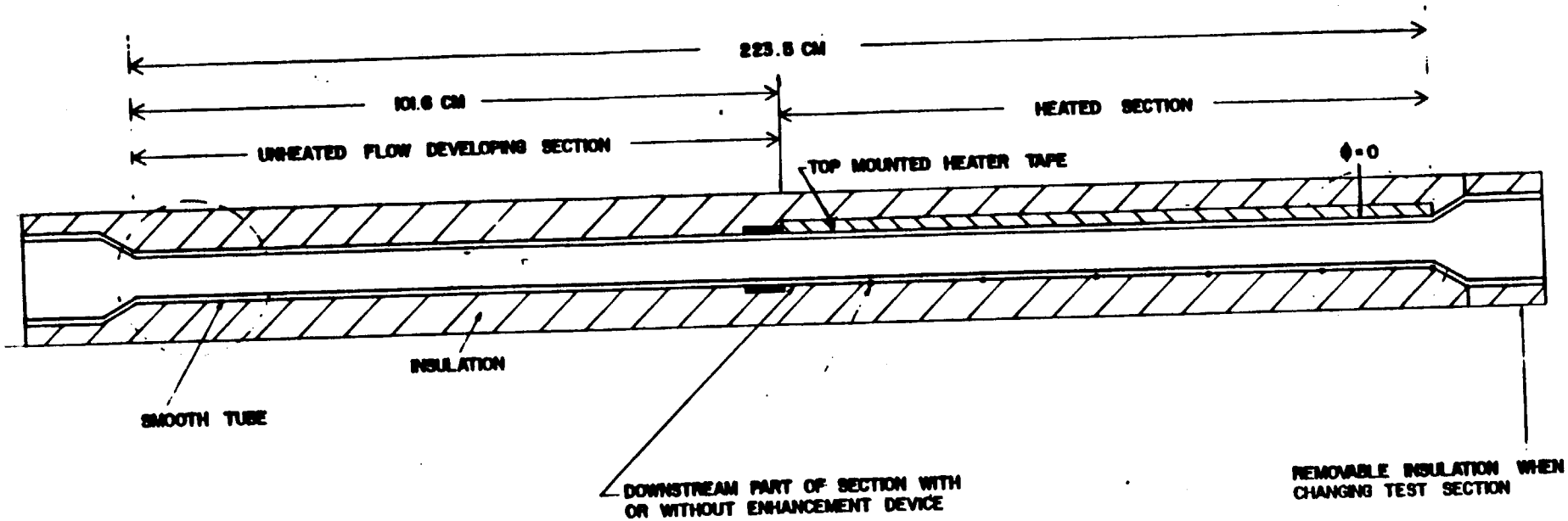

Figure 2: Horizontal Test Section for Measuring Local Heat Transfer Coefficient Distributions.

Figure 3: Test Section Internal Configurations.

Tube Type	O. D.	I. D.	No. Fins	Fin Height	Fin Width	Fins/cm
Spiral Fin L. P.	1.27 *cm*	0.95 *cm*	16	0.056 *cm*	0.30 *cm*	4
Spiral Fin L.P./Tape	1.27 *cm*	0.95 *cm*	16	0.056 *cm*	0.30 *cm*	4
Spiral Fin S. P.	1.27 *cm*	1.13 *cm*	26	0.056 *cm*	0.30 *cm*	6
Smooth	1.27 *cm*	1.07 *cm*	—	—	—	—
Smooth[7]	1.59 *cm*	1.37 *cm*	—	—	—	—
Smooth	2.225 *cm*	1.905 *cm*	—	—	—	—
Smooth	2.66 *cm*	2.54 *cm*	—	—	—	—

The following tubes were only exposed to top-heating: Spiral Fin L. P., Spiral Fin S. P., and Smooth 1.905 & 2.54 *cm* Tubes. In addition to top-heating, the 1.27 *cm* Smooth and the Spiral Fin L. P./Tape were exposed to uniform heating.

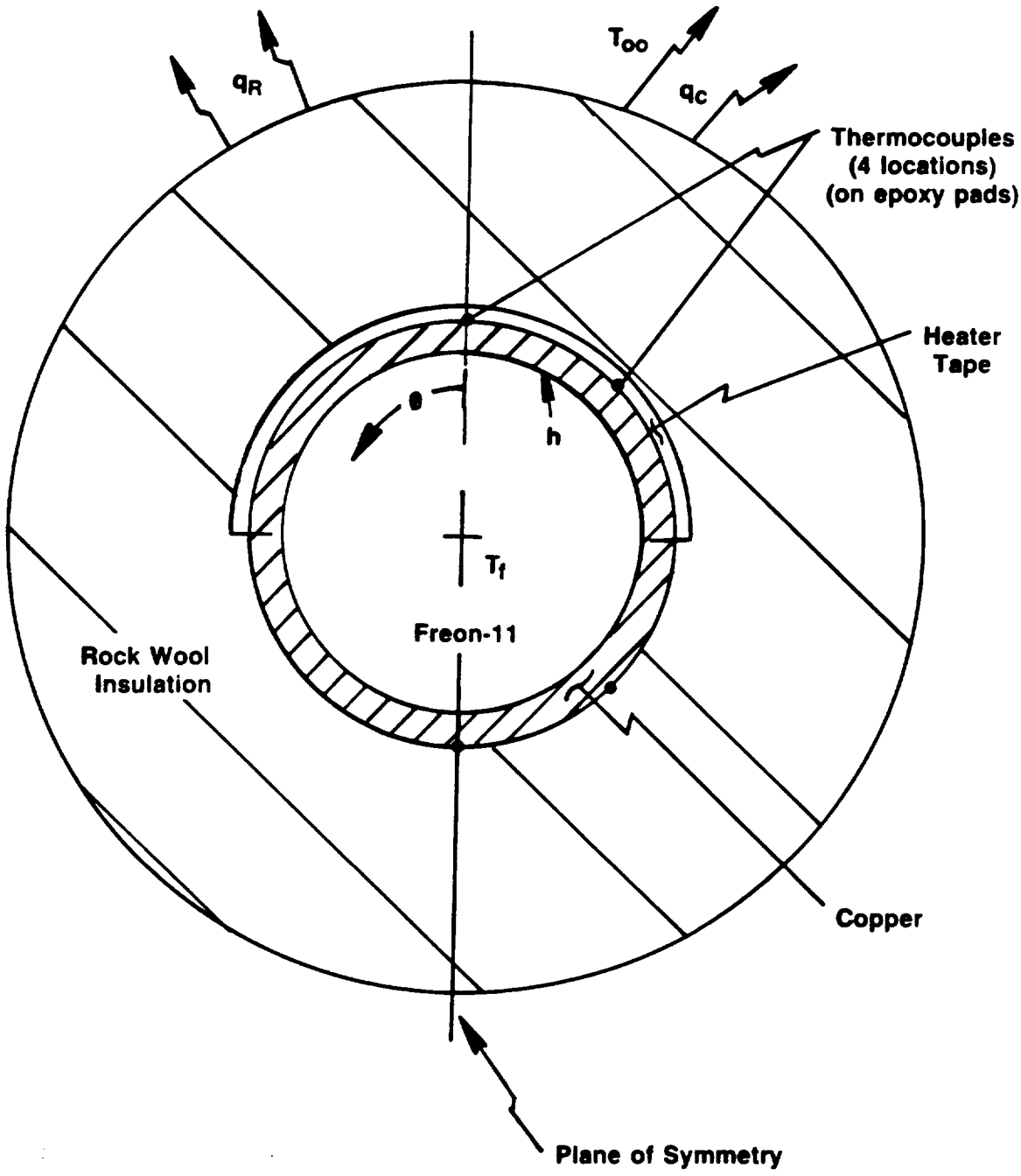

Figure 4: Cross Section of the Heated Portion of the Test Section.

LOCATION MEASUREMENTS (cm)						
Z1	Z2	Z3	Z4	Z5	Z6	Z7
0.00	20.32	40.64	60.96	81.28	101.60	121.9

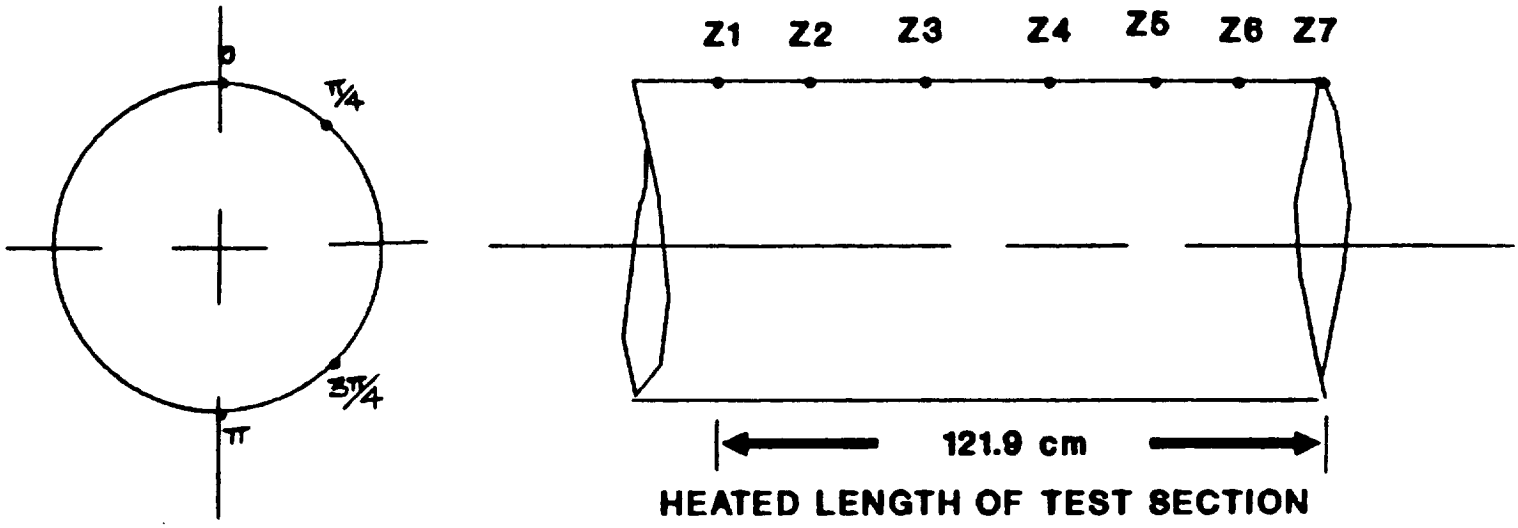

Figure 5: Locations in which Local Outside Wall Temperature Measurements were Made.

Data Reduction

A data reduction technique based on the heated hydraulic diameter [2] (see Figure 6), was used to reduce the experimental data. This approach will result in, at most, a qualitative indication of the local circumferential distribution of h. However, if based on the circumferentially averaged temperature, the this technique will give quantitative results for the axial distribution of the heat transfer coefficient. Work is proceeding on developing other data reduction approaches; e.g., a finite difference approach (as time permits) for local circumferential variations in h, and an analytical approach (major emphasis) for an axial distribution of the circumferential mean value of h.

In applying either model, knowledge of the fluid's bulk temperature must be used. An iteration scheme is used to compute the inside wall temperature, T_w, of the flow channel. The fluid's temperature is chosen based on the magnitude of the inside wall temperature relative to the wall temperature required to cause the onset to nucleate boiling (T_{ONB}). If T_w is greater than than T_{ONB}, the fluid temperature is set equal to the saturation temperature. However, if the above condition is not satisfied, the fluid temperature is computed from the energy equation, using the measured inlet fluid temperature and the measured net thermal

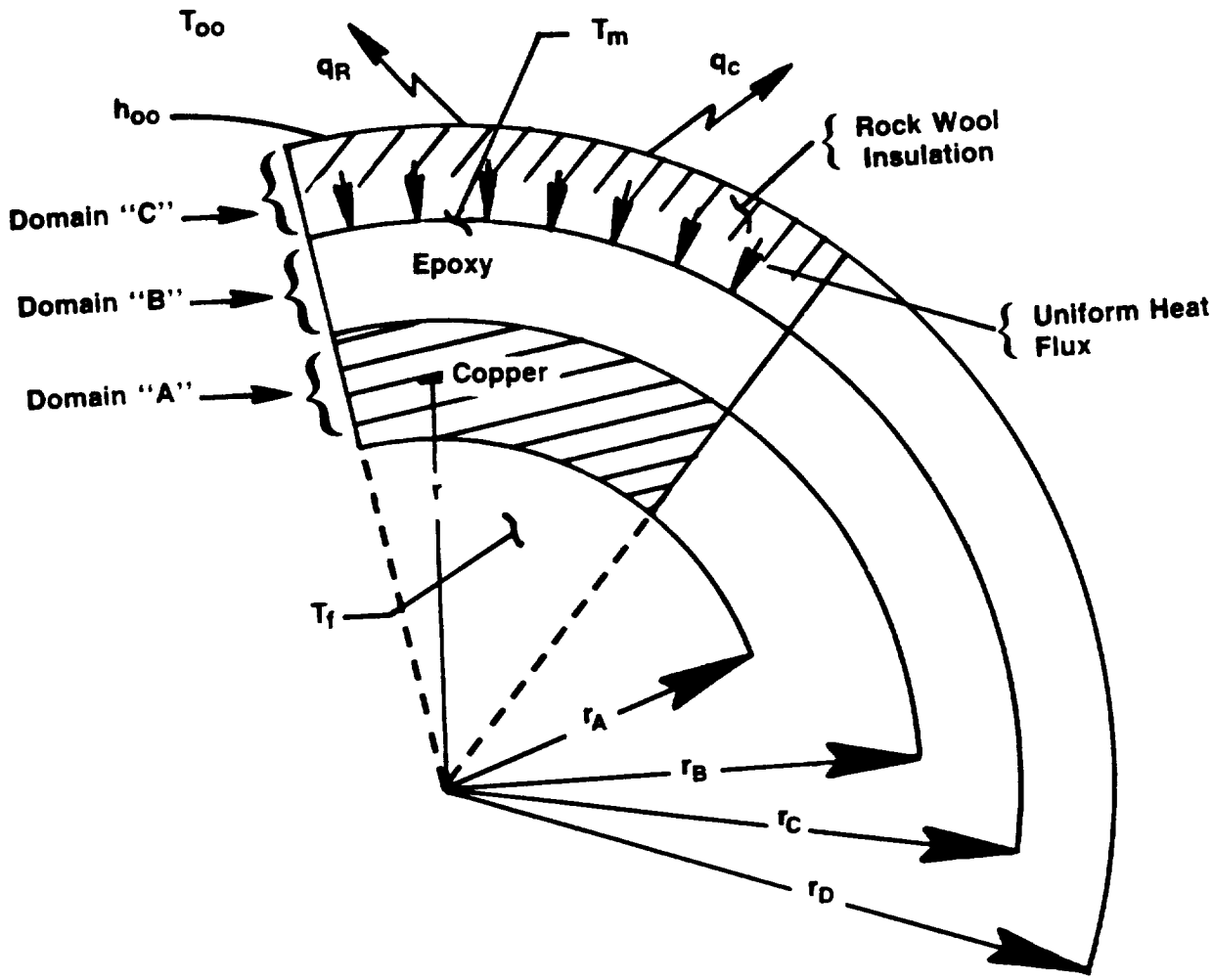

Figure 6: Control Volume for the Heated Hydraulic Diameter Model.

energy transfer to the fluid. Figure 7 shows typical curves of the inlet and out fluid temperature measurements for the test section with spiral fins (large pitch). Presently, the superheat required for the onset of nucleate was assumed to be 5.9 °C. This restriction will be later relaxed so that actual T_{ONB} will be compared with all values of T_w for all axial locations and power levels.

Experimental Matrix

The experimental flow matrix shown in Figure 8 contains a composite of all the experiments which have been planned. The present work includes all the cases shown except the uniformly-heated and the corresponding top-heated cases. As shown by the matrix, h is being evaluated as a function of: (1) Channel internal configuration (smooth-wall, spiral fins large and small pitch [LP and SP, respectively], spiral fins with twisted tape), (2) mass velocity, (3) subcooling ($T_{sat}-T_f$), and (4) inside diameter.

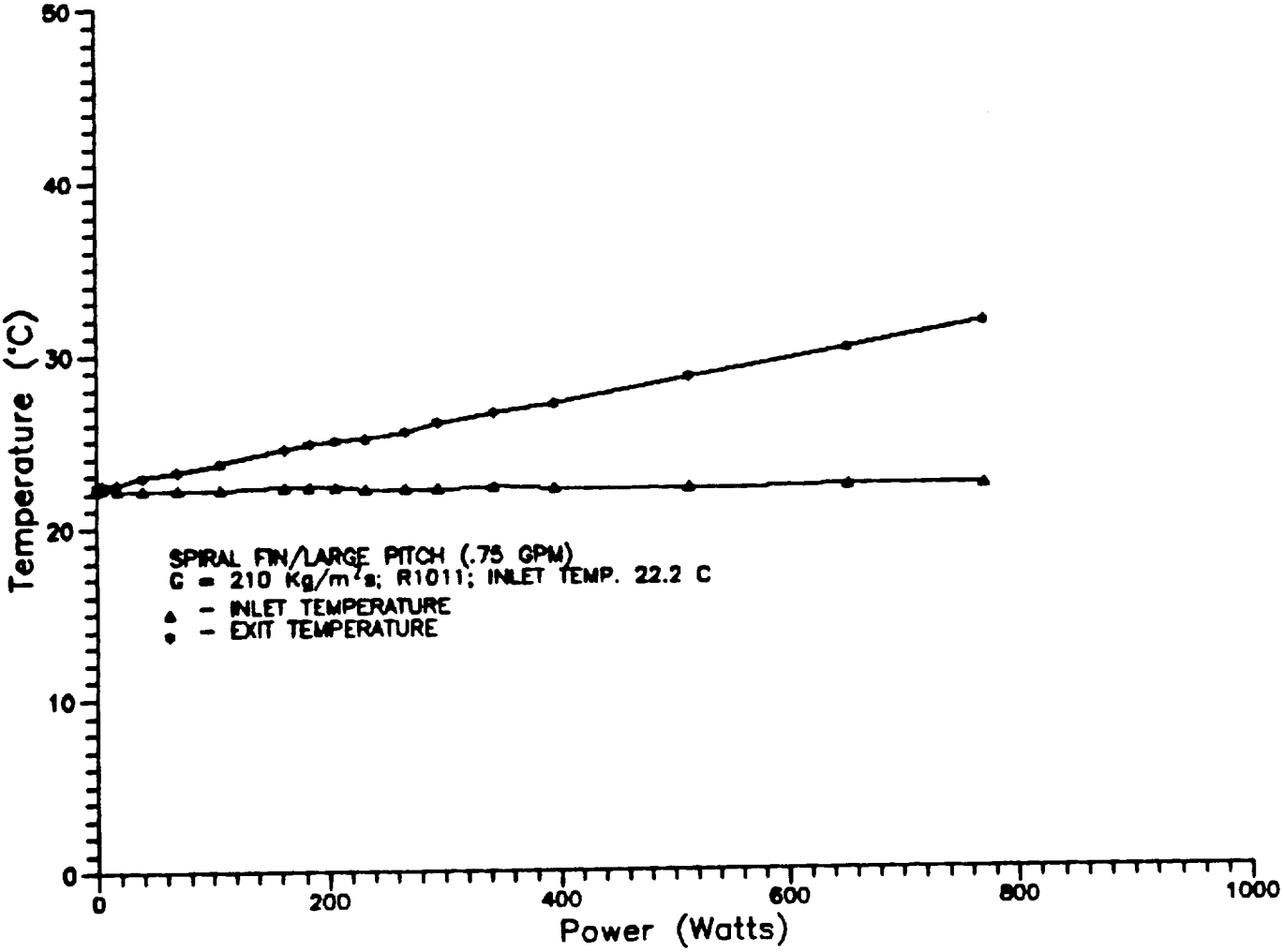

Figure 7: Measured Inlet and Exit Freon-11 Temperatures for the the Coolant Channel with Internal Large Pitch Spiral Fins (Typical).

Figure 8: Experimental Flow Matrix

TUBE	I.D.	INLET TEMP.	FLOWRATE	HEATING	*EXIT PRESSURE
SMOOTH	1.05 cm	22.2°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SMOOTH	1.05 cm	22.2°C	210 kg/m^{2}s	UNIFORMILY	0.0862075 MPa
SMOOTH	1.05 cm	22.2°C	281 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SMOOTH	1.05 cm	22.2°C	281 kg/m^{2}s	UNIFORMILY	0.0862075 MPa
SPIRAL/TAPE LP	0.95 cm	22.2°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SPIRAL/TAPE LP	0.95 cm	22.2°C	210 kg/m^{2}s	UNIFORMILY	0.0862075 MPa
SPIRAL/TAPE LP	0.95 cm	22.2°C	281 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SPIRAL/TAPE LP	0.95 cm	22.2°C	281 kg/m^{2}s	UNIFORMILY	0.0862075 MPa
SPIRAL FIN LP	0.95 cm	15°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SPIRAL FIN LP	0.95 cm	18°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SPIRAL FIN LP	0.95 cm	22.2°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SPIRAL FIN LP	0.95 cm	30°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SPIRAL FIN LP	0.95 cm	38.4°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SPIRAL FIN SP	1.13 cm	22.2°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SPIRAL FIN SP	1.13 cm	23.5°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SPIRAL FIN SP	1.13 cm	23.5°C	281 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SMOOTH	1.905cm	22.2°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SMOOTH	2.54 cm	22.2°C	210 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SMOOTH	1.05 cm	22.2°C	140 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SMOOTH	2.54 cm	22.2°C	140 kg/m^{2}s	TOP-HEATING	0.0862075 MPa
SMOOTH	2.54 cm	22.2°C	281 kg/m^{2}s	TOP-HEATING	0.0862075 MPa

* Denotes Gauge Pressure

RESULTS

The appendix contains preliminary experimental plots and data for selected cases from the experimental matrix. Brief discriptions of the test section configuration, flow conditions, and the experimental test number are given in both the plots and and the data tables. These results are presently being studied and will be recast in other forms so that suitable comparisons and interpretations can be made. Because of the preliminary nature of the present results, only a portion of this data will be briefly discussed.

Figure 9 shows a comparison of the overall (i.e., averaged circumferentially and axially) heat transfer coefficient for four cases: (1) spiral fin, large pitch (LP, 4.0 fins per cm); (2) spiral fin, small pitch (SP, 6.52 fins per cm); (3) spiral fin, large pitch and with a twisted tape; and (4) smooth tube. In all cases, the horizontal coolant channel was heated from the top. The results show that the spiral fins with the large pitch resulted in a higher heat transfer coefficient at all power levels. The discontinuities in each curve are a result of nucleate boiling occurring at certain axial or circumferential locations at given power levels. Since the test section was

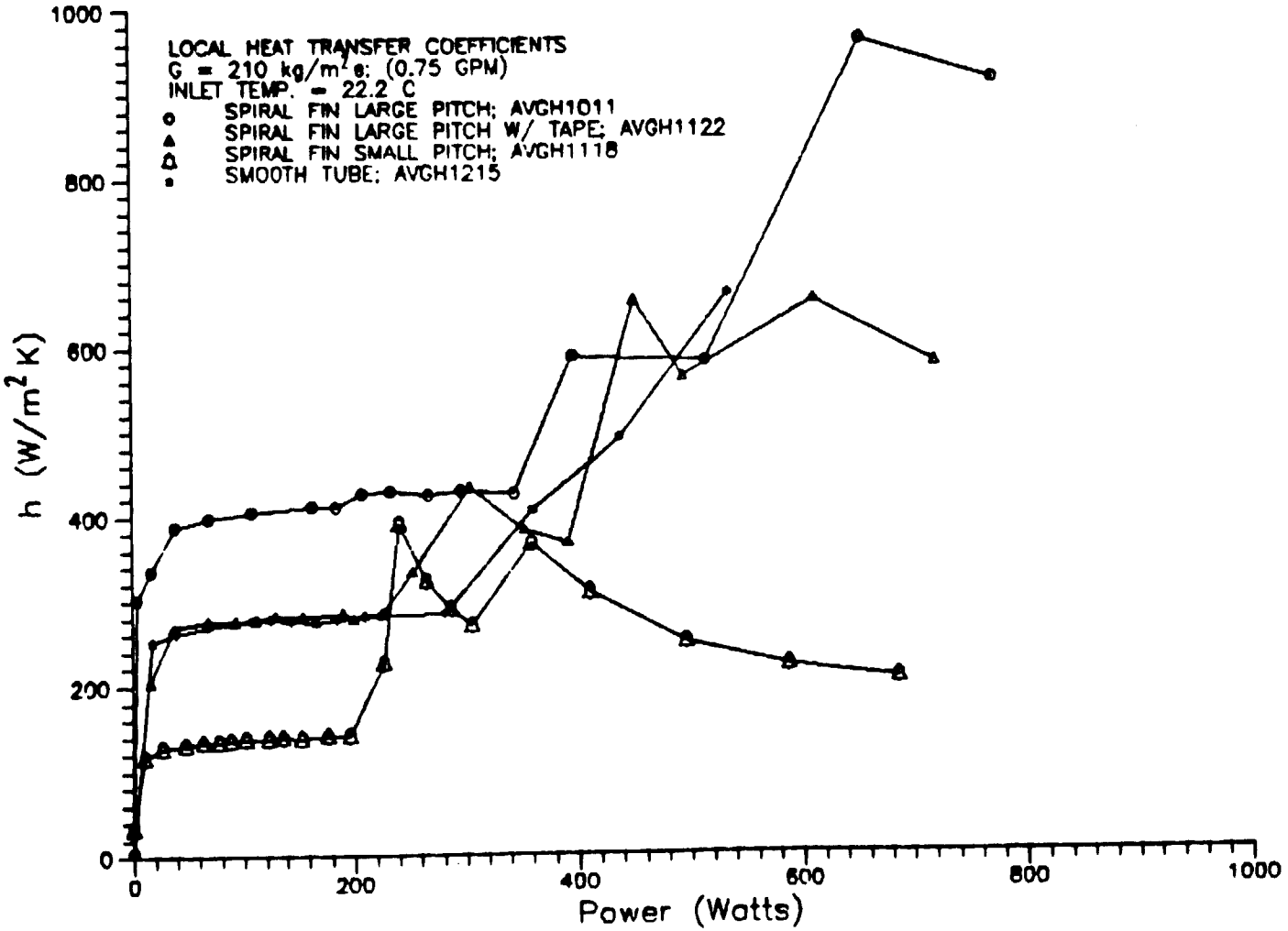

Figure 9: Comparison of the Overall Heat Transfer Coefficients for Circular Coolant Channels with Different Internal Configurations.

horizontal and since the mass velocity level was relatively low (low Froude number), stratification effects were expected and found to be significant.

Stratification conditions reduced the enhancement effectiveness for all internal configurations. Preliminary estimates indicate that these reductions could be as high as an order of magnitude relative to vertical flows. Figures 10 and 11 show preliminary predictions of the axial distribution of h for uniformly heated smooth coolant channels for horizontal flow. Kandlikar's correlation [3] was used. These predictions for h are greater than the measured values of h for smooth tubes. Verification of the calculations and experimental data is continuing.

Figures 12 (12a, 12b, 12c, and 12d) and 13 (13a, 13b, 13c, 13d) show the power generation as a function of temperature for the cases of spiral fins (LP) with and and without a twisted tape, respectively. The four figures in each of these sets are for each of the four circumferential locations (Phi = ϕ = 0, $\pi/4$, $3\pi/4$, and π). A one-to-one comparison of the figures (i.e., Figures 12a with 13a, 12b with 13b, etc.) of each channel configuration for a given value of ϕ shows that the spiral fins with the twisted tape enhances stratification rather than heat transfer. As ϕ varies from 0 to $\pi/4$, the peak wall temperature for this case are

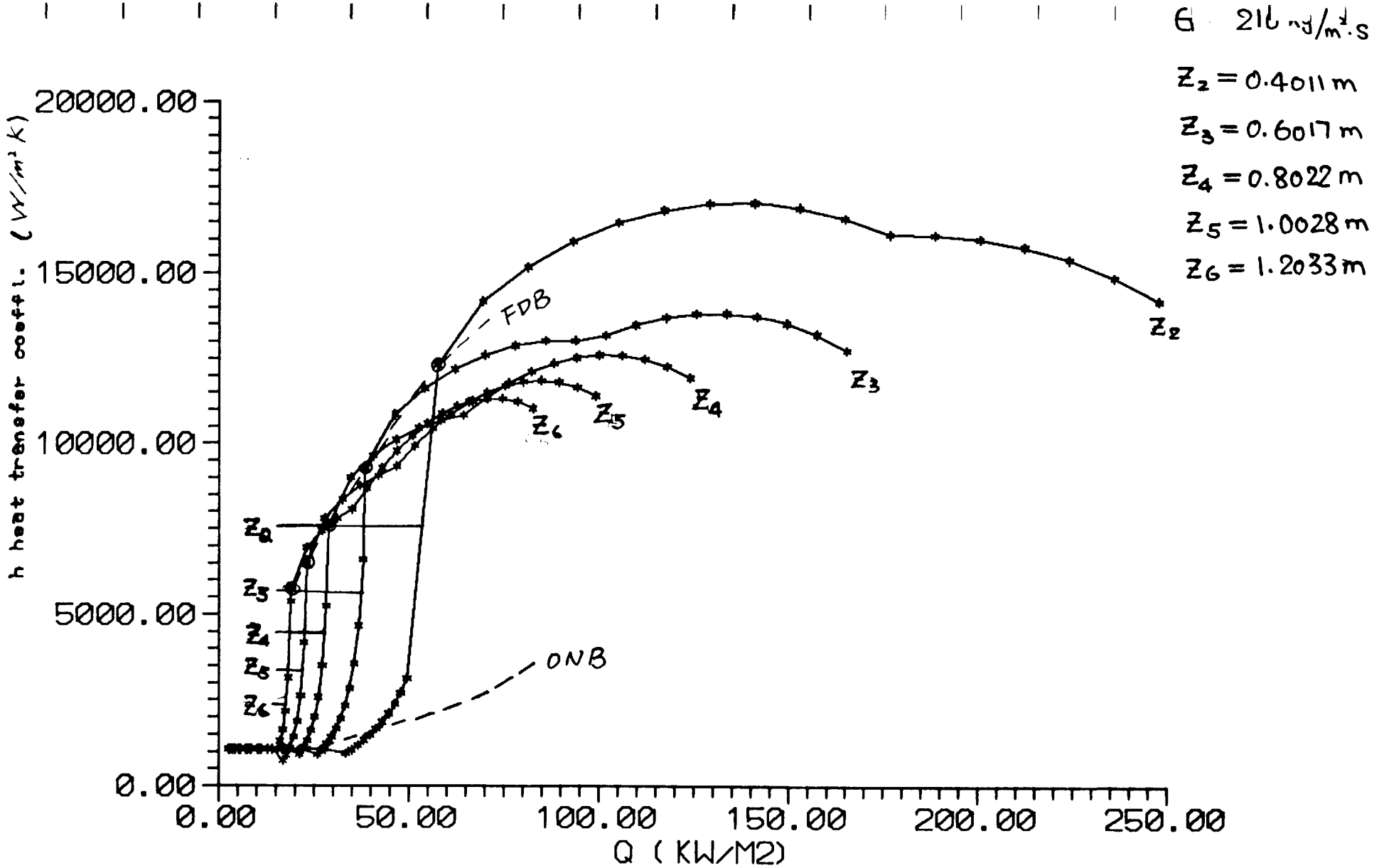

Figure 10: Preliminary Predictions of the Axial Variation of the Heat Transfer Coefficient For Horizontal, Smooth, Uniformly-Heated Coolant Channels. G= 210.0 kg/m²s.

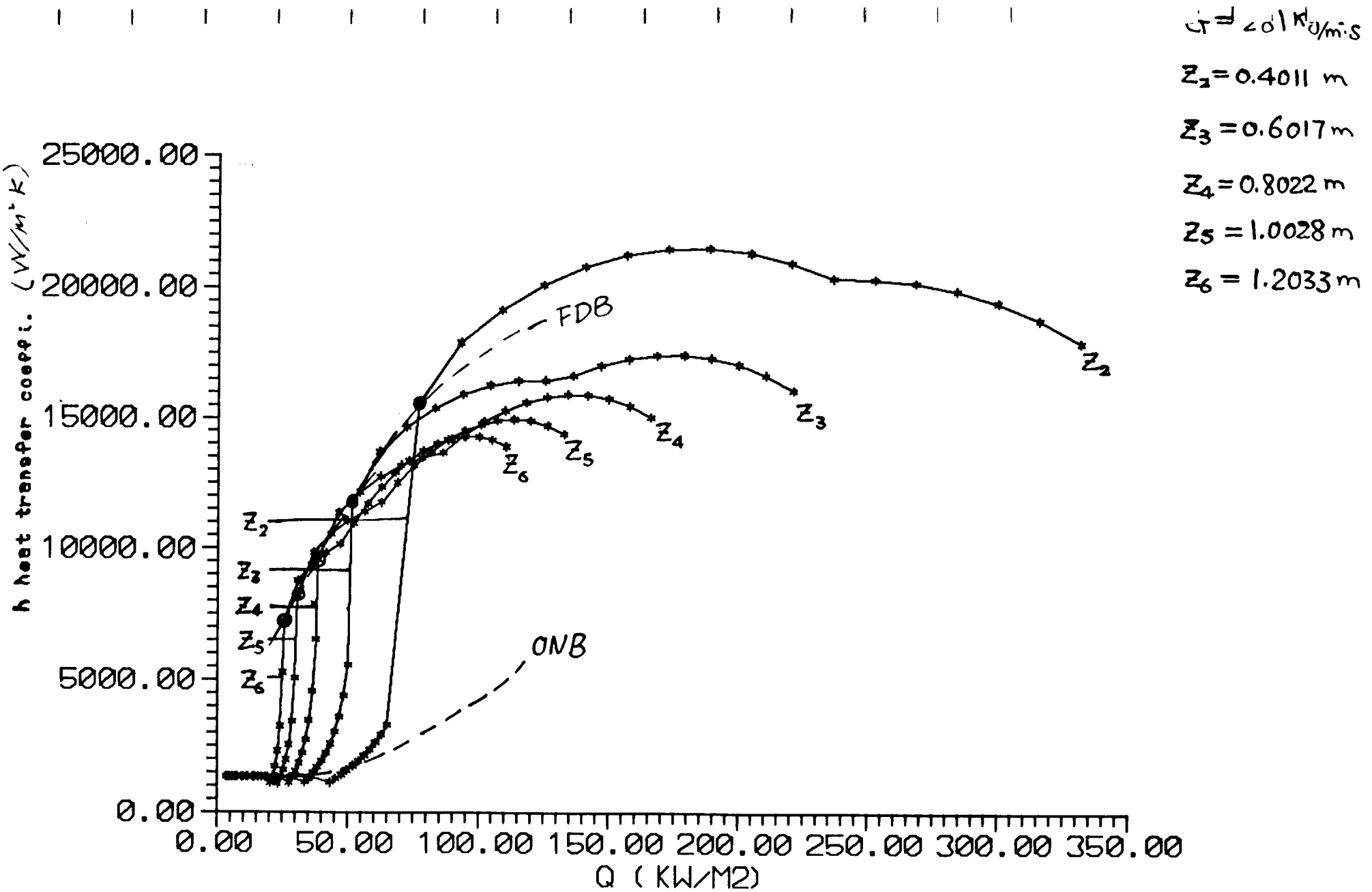

Figure 11: Preliminary Predictions of the Axial Variation of the Heat Transfer Coefficient For Horizontal, Smooth, Uniformly-Heated Coolant Channels. G= 281.0 kg/m²s.

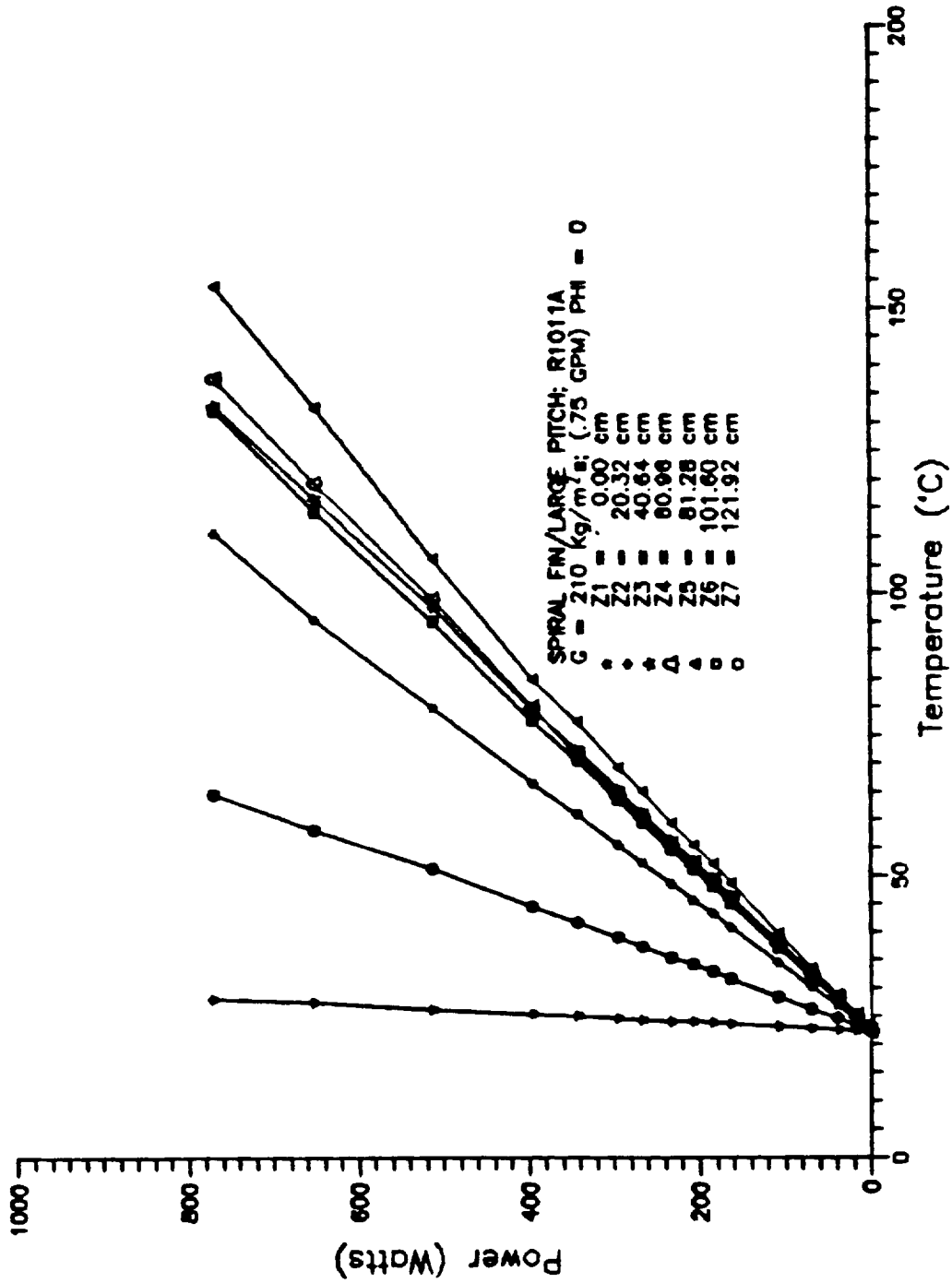

Figure 12a: Measured Outside Wall Temperature Axial Distribution as a Function of the Net Power Generation for $\phi = 0$ radians (top of the test section). Spiral Fins Large Pitch Internal Geometry.

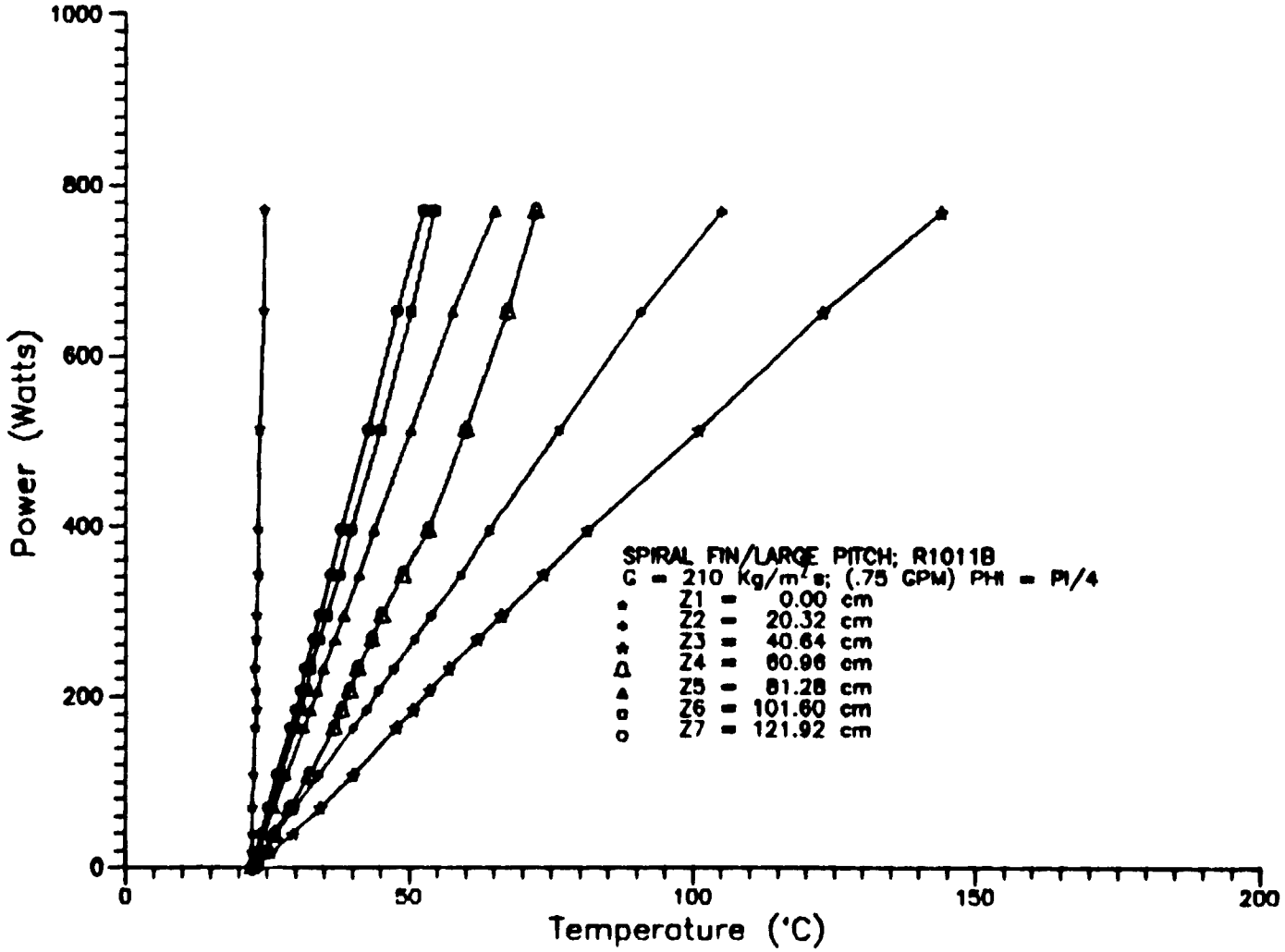

Figure 12b: Measured Outside Wall Temperature Axial Distribution as a Function of the Net Power Generation for $\phi = \pi/4$ radians. Spiral Fins Large Pitch Internal Geometry.

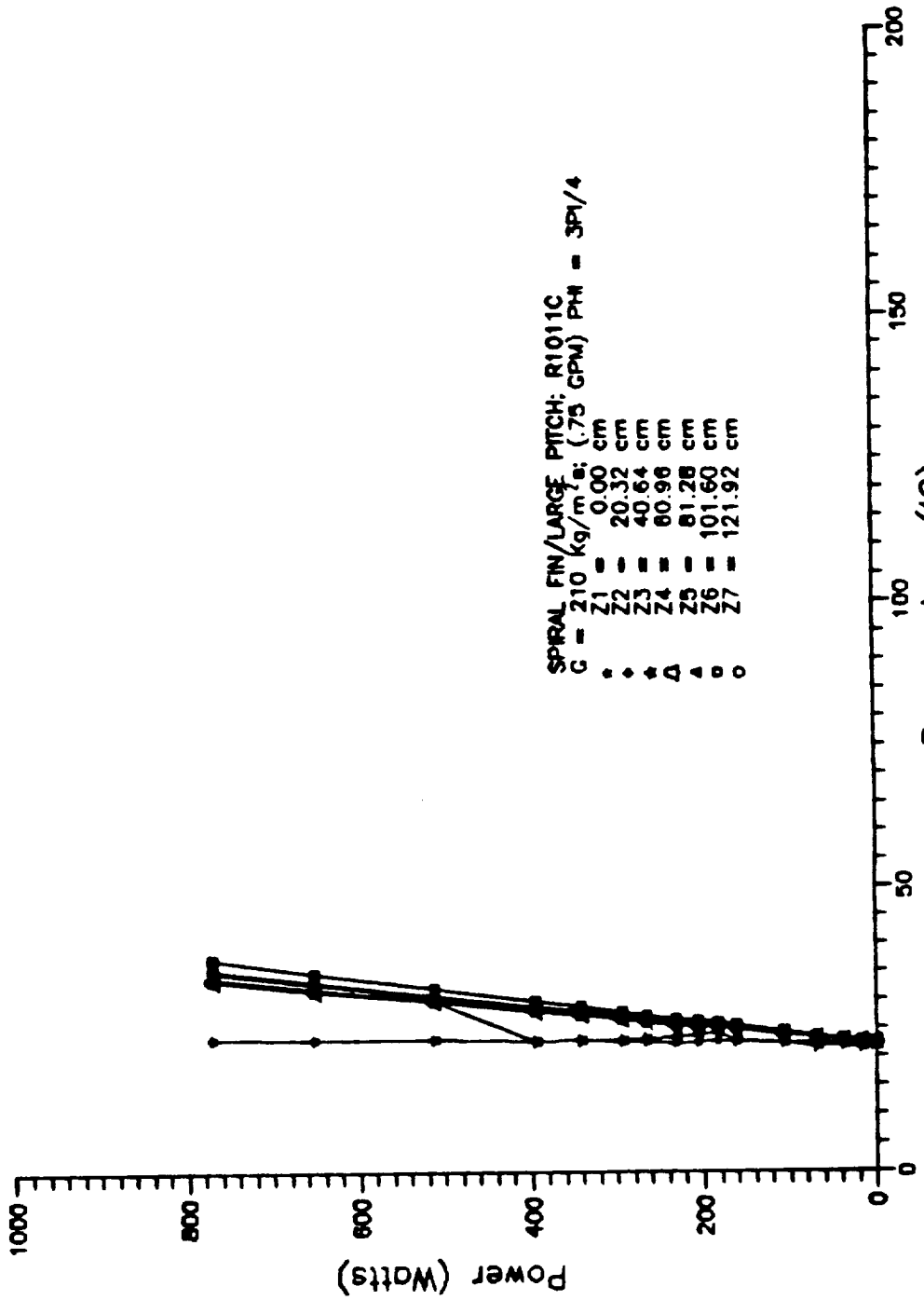

Figure 12c: Measured Outside Wall Temperature Axial Distribution as a Function of the Net Power Generation for $\phi = 3\pi/4$ radians. Spiral Fins Large Pitch Internal Geometry.

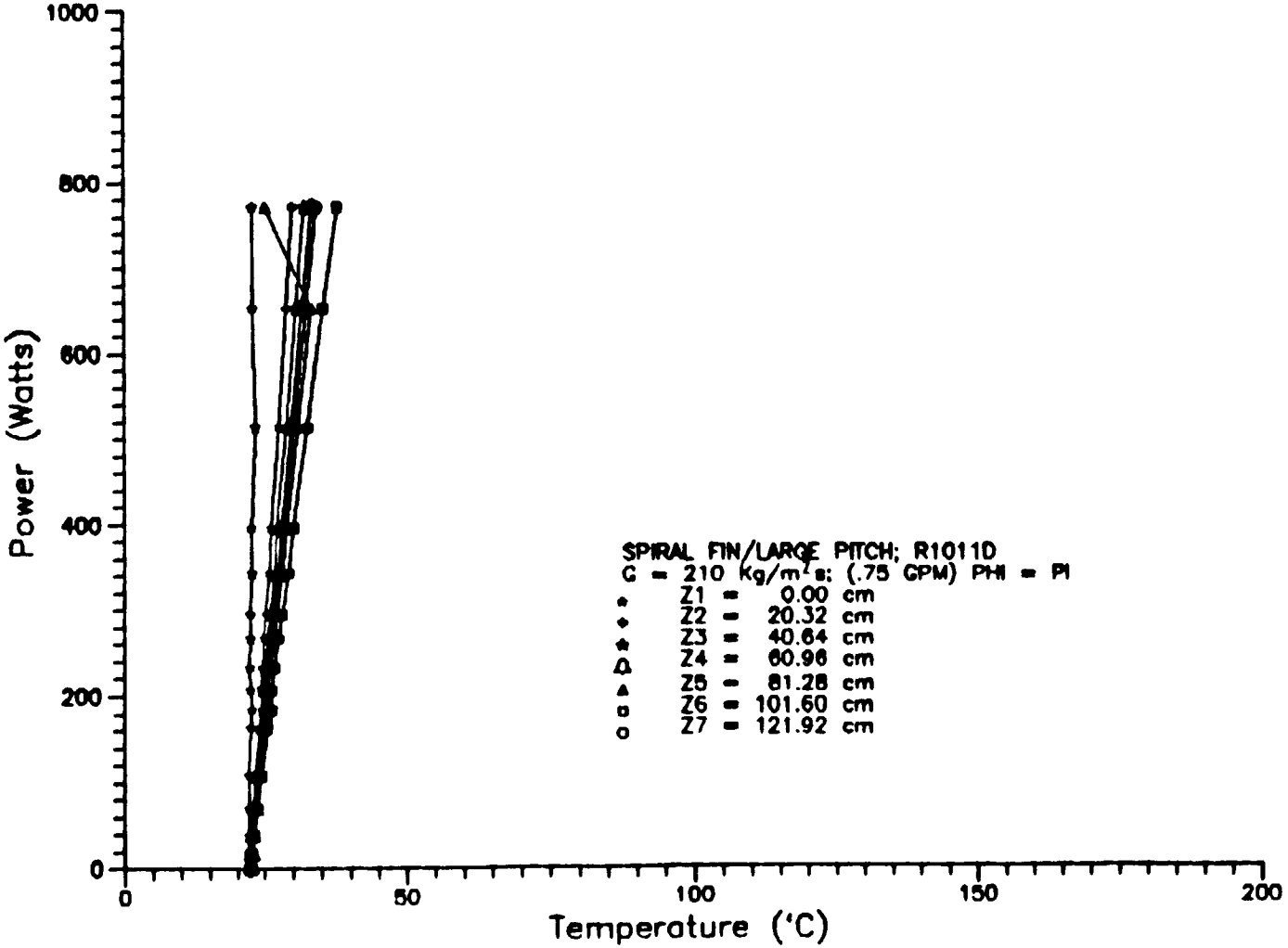

Figure 12d: Measured Outside Wall Temperature Axial Distribution as a Function of the Net Power Generation for $\phi = \pi$ radians. Spiral Fins Large Pitch Internal Geometry.

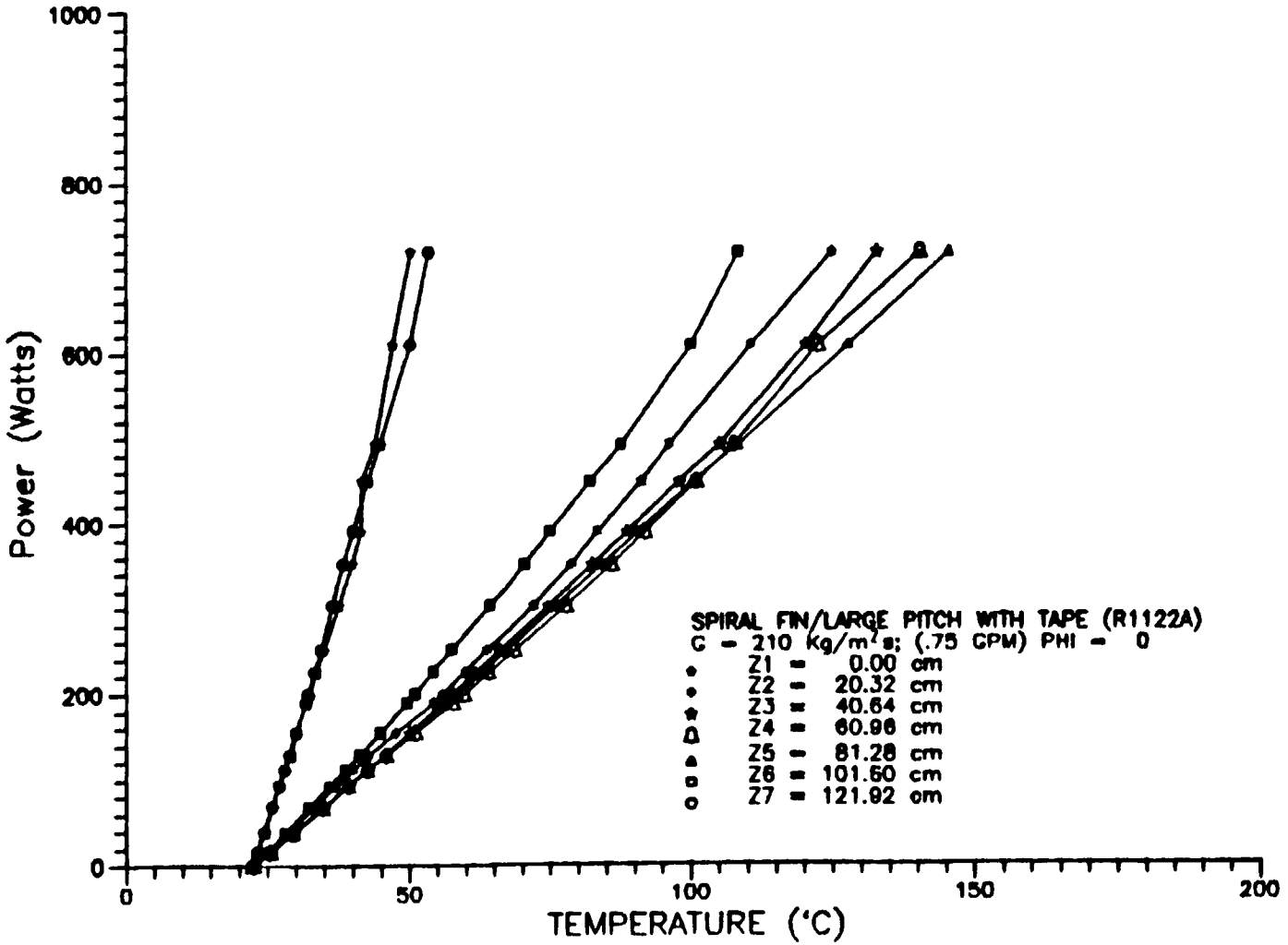

Figure 13a: Measured Outside Wall Temperature Axial Distribution as a Function of the Net Power Generation for ϕ = 0 radians. Spiral Fins Large Pitch with a Twisted Tape Internal Geometry.

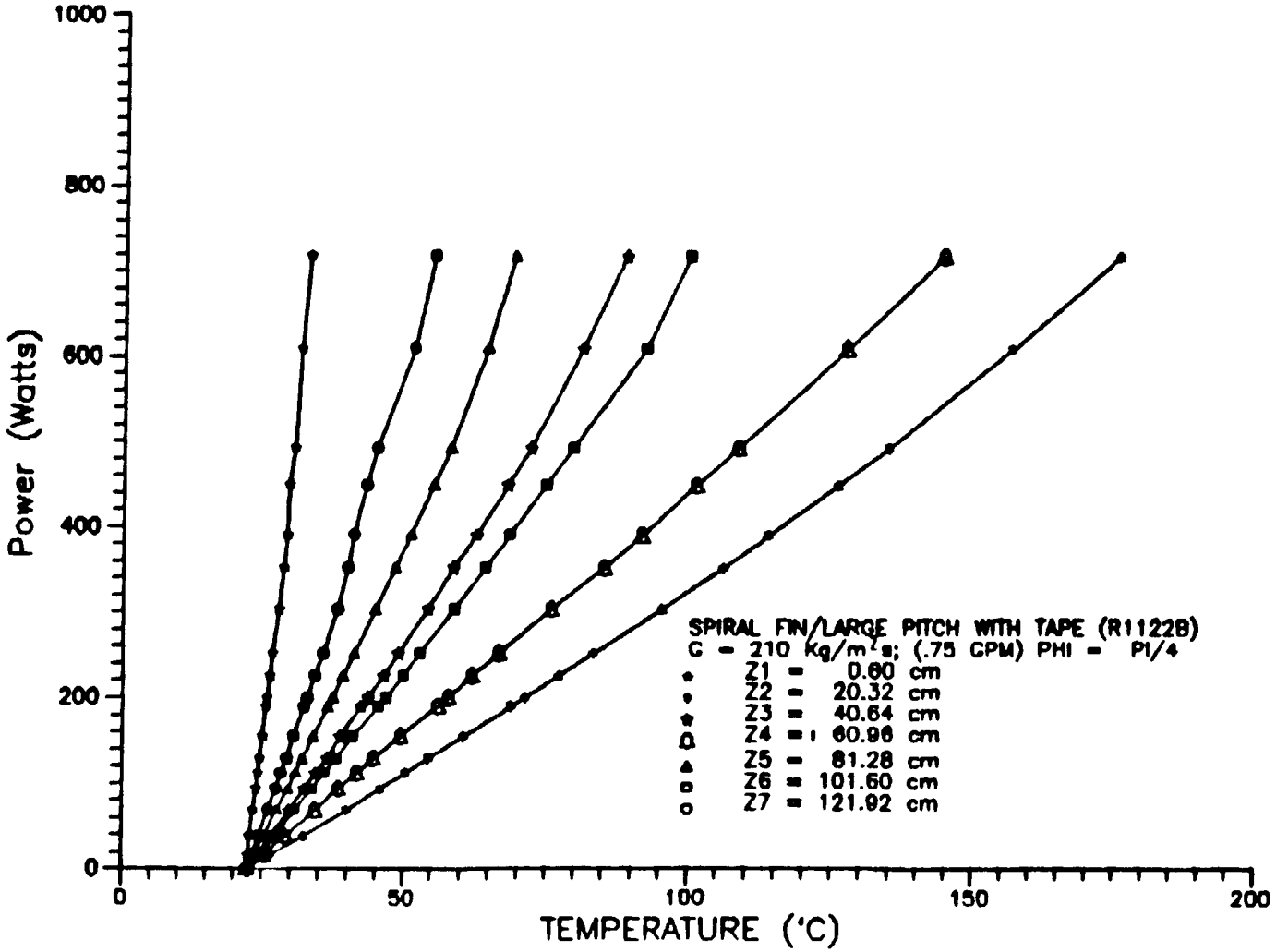

Figure 13b: Measured Outside Wall Temperature Axial Distribution as a Function of the Net Power Generation for $\phi = \pi/4$ radians. Spiral Fins Large Pitch with a Twisted Tape Internal Geometry.

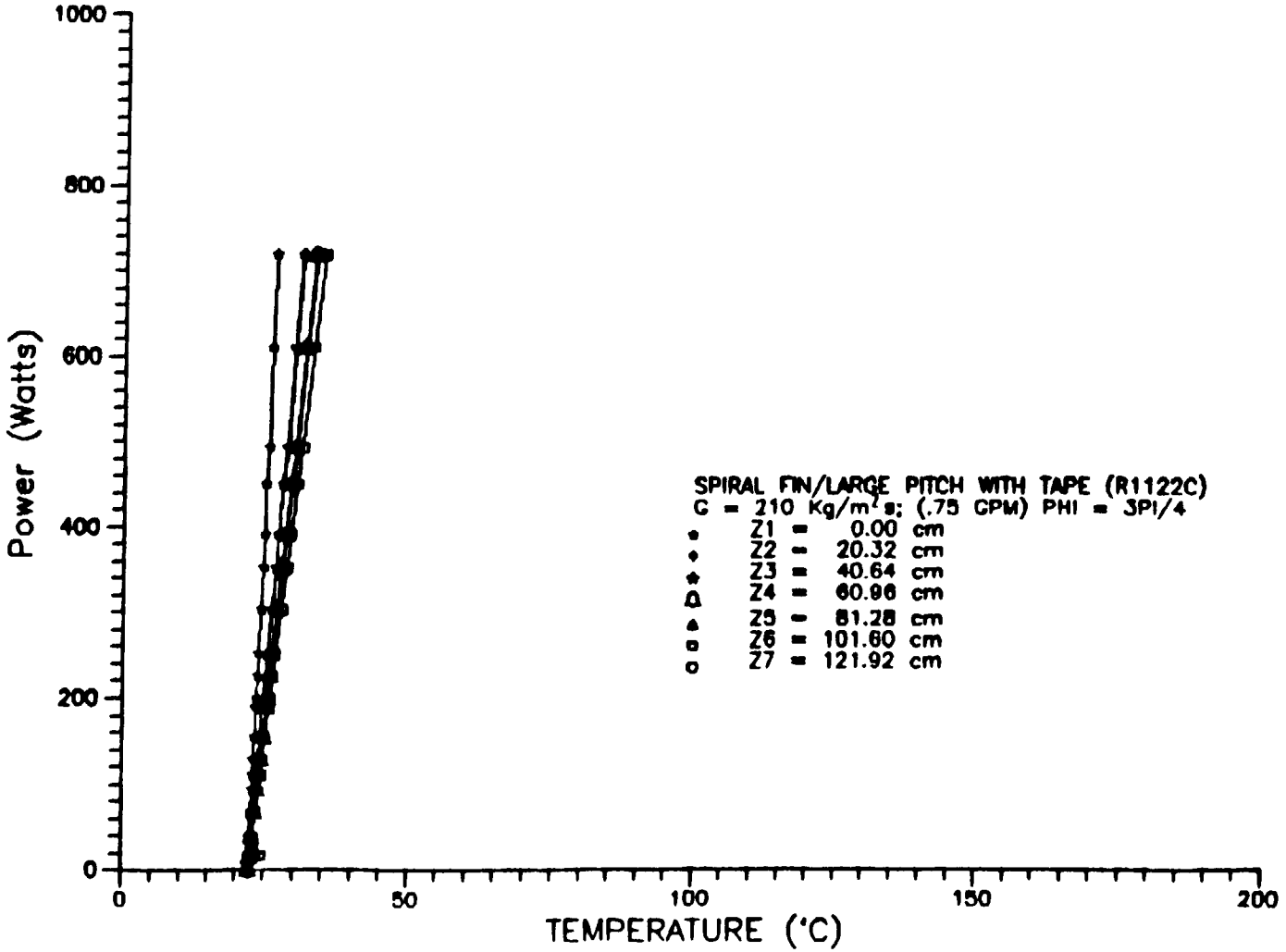

Figure 13c: Measured Outside Wall Temperature Axial Distribution as a Function of the Net Power Generation for $\phi = 3\pi/4$ radians. Spiral Fins Large Pitch with a Twisted Tape Internal Geometry.

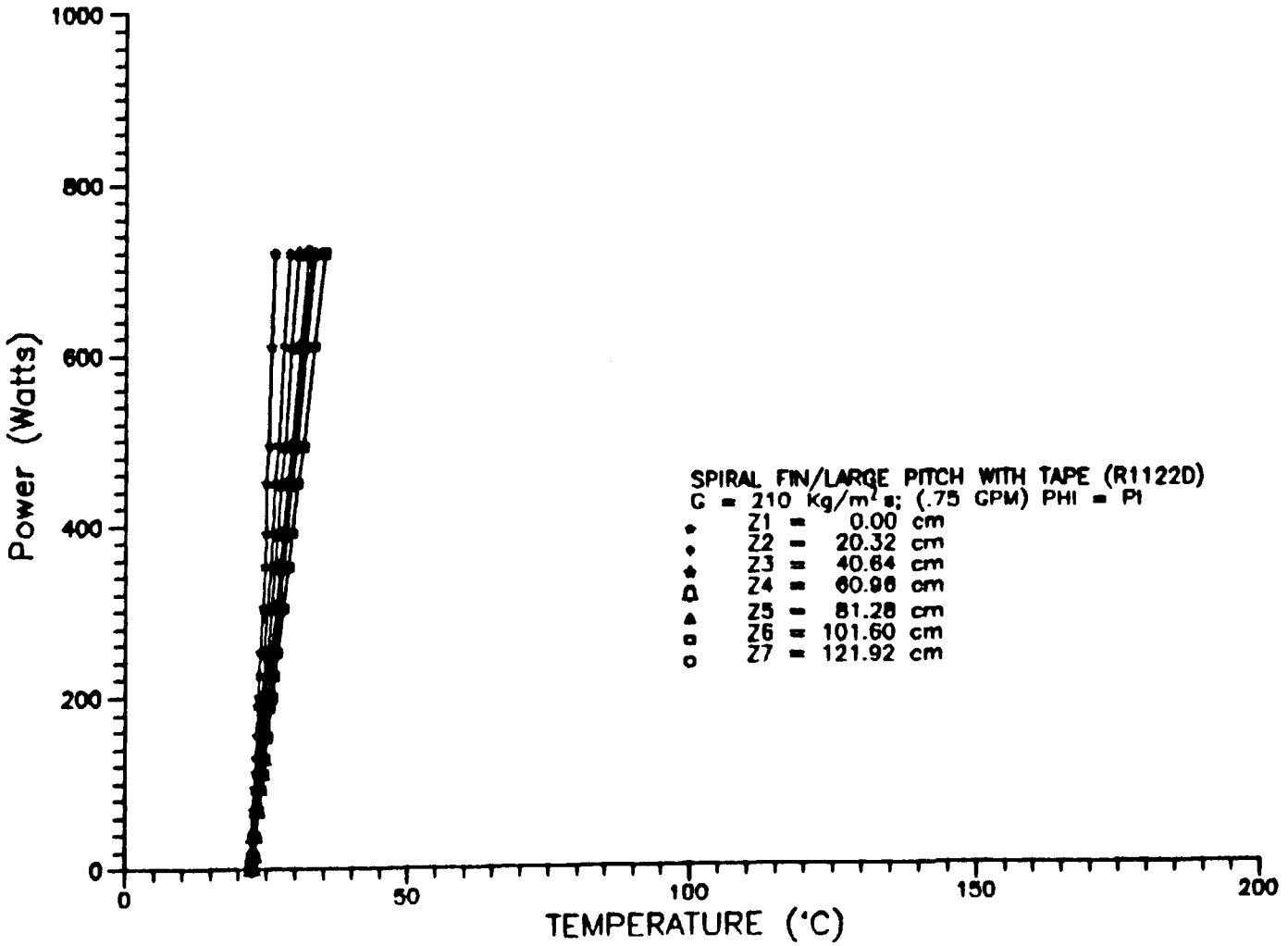

Figure 13d: Measured Outside Wall Temperature Axial Distribution as a Function of the Net Power Generation for $\phi = \pi$ radians. Spiral Fins Large Pitch with a Twisted Tape Internal Geometry.

consistently higher than the channel with only the large pitch spiral fins. This will be more dramatically displayed in the final report by presenting the data as T_w versus Z, with ϕ and power as parameters. In this representation, one would observe two quite different distributions. Without the twisted tape and for ϕ = 0, the wall temperature profile between Z_2 (= 0.0 cm) and Z_3 (=1.28 cm) is essentially uniform at a level of 115°C. Contrasting this broad and rather uniform profile, the tube with both spiral fins and a twisted tape had a very narrow axial profile. The peak outside wall temperature was near 175°C. Further, in this latter case and for $\phi = \pi/4$, the wall temperature varied axially in a periodic manner between 175°C and 90°C. The period of this variation was about 40.0 cm. Later, such periods will be compared with the period of the twisted tape and spiral fins. The amplitude of the fluctuations decreased as Z increased. These latter trends were caused by: (1) periodic liquid wetting at the top surface of the tube due to the swirl flow, (2) liquid entrainment into the vapor flow, and (3) circumferential conduction in the tube. In both tube configurations, the wall temperature increased (from 25°C) with Z near the entrance (Z_1) and later decrease (to near 25°C) as Z increased near the exit (Z_7).

Figures 12 and 13 emphasize the significance of the circumferential variations in systems with single-side heating. It is quite apparent that in cases where stratification is important, the addition of a twisted tape will exacerbate the already large wall temperature and small heat transfer coefficient. However, the data also indicate the possible twisted tape configuration which, rather than inhibit, will enhance the heat transfer. Before this possibility of enhancement is discussed, the adverse influence of the twisted tape on h will be discussed further.

The detrimental influence on h due to the addition of the twisted tape is emphasized in Figure 14 where the circumferential averaged heat transfer coefficients were plotted as a function of the power generation level, with Z as a parameter. At each axial location, a sudden rise in h is a manifestation of the inside wall temperature (computed from the measured outside wall temperature) exceeding the absolute wall superheat level required for the onset of nucleate boiling (ONB). For purposes of preliminary data reduction, the relative superheat was assumed to be constant at 5.9°C. Relatively speaking, Figure 14 also shows that larger values of h (1500 to 2000 W/m^2K) were obtained at both the entrance (Z_1) and the exit (Z_7) than at intermediate locations. This is due primarily to the presence of the single-phase liquid

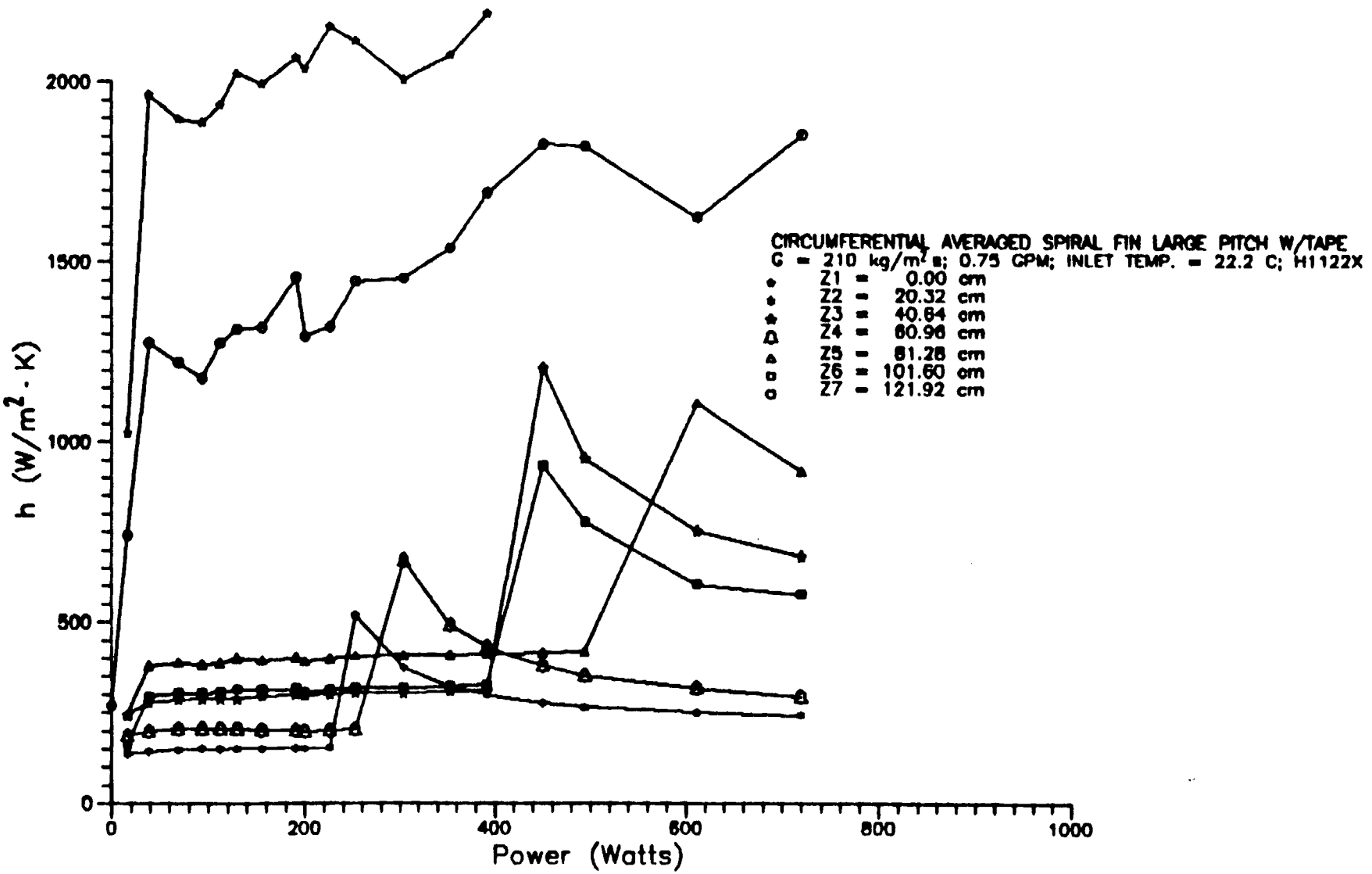

Figure 14: Measured **Circumferential Averaged** Axial Distribution of Heat Transfer for a Coolant Channel with Both Large Pitch Spiral Fins and a Twisted Tape.

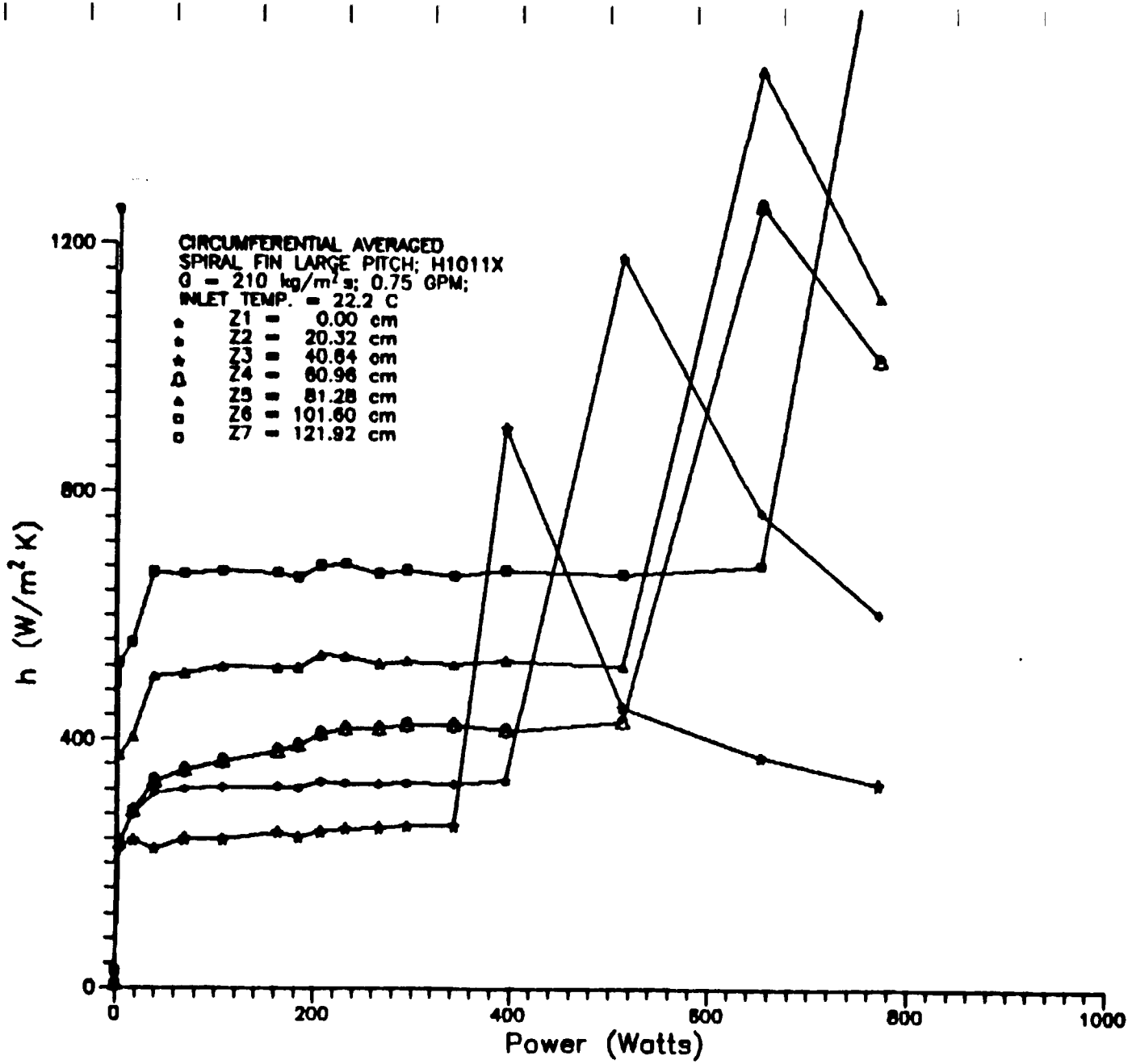

Figure 15: Measured **Circumferential Averaged** Axial Distribution of Heat Transfer for a Coolant Channel with Both Large Pitch Spiral Fins.

at the at the bottom of the tube and axial conduction losses near the exit. The exit conduction losses will be examined further. Nevertheless, when the values of h at these intermediate levels are compared with those of Figure 15 (tube without a twisted tape), one finds that the levels of h before and after ONB are higher for the tube without the twisted tape.

The above trends could possibly be reversed by reconfiguring the twisted tape. The twisted tape's twist ratio (t_T, ratio of axial period to the inside diameter) appears to be the underlying factor which could improve the enhancement capabilities of the tube with both fins and a twisted tape. Supporting evidence for this possibility can be observed in Figure 13b ($\phi = \pi/4$). This figure is compared with the corresponding Figure 12b, which corresponds to the case of large pitch fins without the twisted tape. As noted earlier, the effect of the twisted tape is to raise the local wall temperature at some axial locations and lower it at other locations. In cases where the wall temperature was lowered, these lower values (as well as the peak values) decreased with increasing Z. It would appear that if the period of these temperature fluctuations could be decreased, the lower levels of the wall temperature would prevail over a larger portion of the flow channel. Lower temperatures, and hence larger h, would result due to increased mixing between the stratified fluid

layers. This overall trend, of enhanced heat transfer accompanying reduced t_T, has been pointed out in the literature but has never [to the PI's knowledge] been documented by local measurements. However, to verify that this is also true for stratified flows, the present work should be extended to include lower values of t_T.

The present work has "set the stage" for additional understanding of localized thermal transport. The present local measurements, which will facilitate this understanding, will form a basis for future comparisons with both three-dimensional numerical predictions and applicable correlations. Such comparisons will be useful in explaining, in more detail the underlying local flow conditions which are favorable to both local and overall heat transfer enhancement. This can be demonstrated in a limited way by noticing in Figures 12b and 13b that the effect of adding a twisted tape was to move the peak wall temperature downstream. Similar expanded comparisons of the other experimental cases, and with existing correlations where applicable , will continue during the latter half of this year.

CONCLUSIONS

The work thus far has resulted in local two-dimensional wall temperature measurements and preliminary freon-11 heat transfer coefficients for top-heated horizontal coolant channels with and without enhancement devices. See the experimental matrix shown in Figure 8. The cases prsented here are for a mass velocity of 210 kg/m^2s, an inlet temperature of 21°C (22°C subcooling), and an exit pressure of 0.19 MPa. Under these conditions, the flow in the coolant channel is developing with regions of: (1) single phase convection, (2) local subcooled boiling, and (3) a predominating stratification flow over most of the channel's length. Other experimental cases, with reduced stratification effects, will be studied.

Thus far, this work has shown that the coolant channel with the large pitch spiral fins has a larger overall heat transfer coefficient (see Figure 9) than smooth tubes, or tubes with either small pitch spiral fins, or a combination of large pitch spiral fins and a twisted tape. However, there is some evidence which indicates that the effectiveness of th latter case will improve for stratified flow as the period of the twisted tape is reduced. Although similar observations have been made in the literature for non-stratified flows, the present local measurements not only documents this effect, but: (1) provides a basis for comparisons with three-dimensional, two-phase, numerical models, (2) forms a basis for assessing present and evolving heat transfer correlations.

ACKNOWLEDGMENTS

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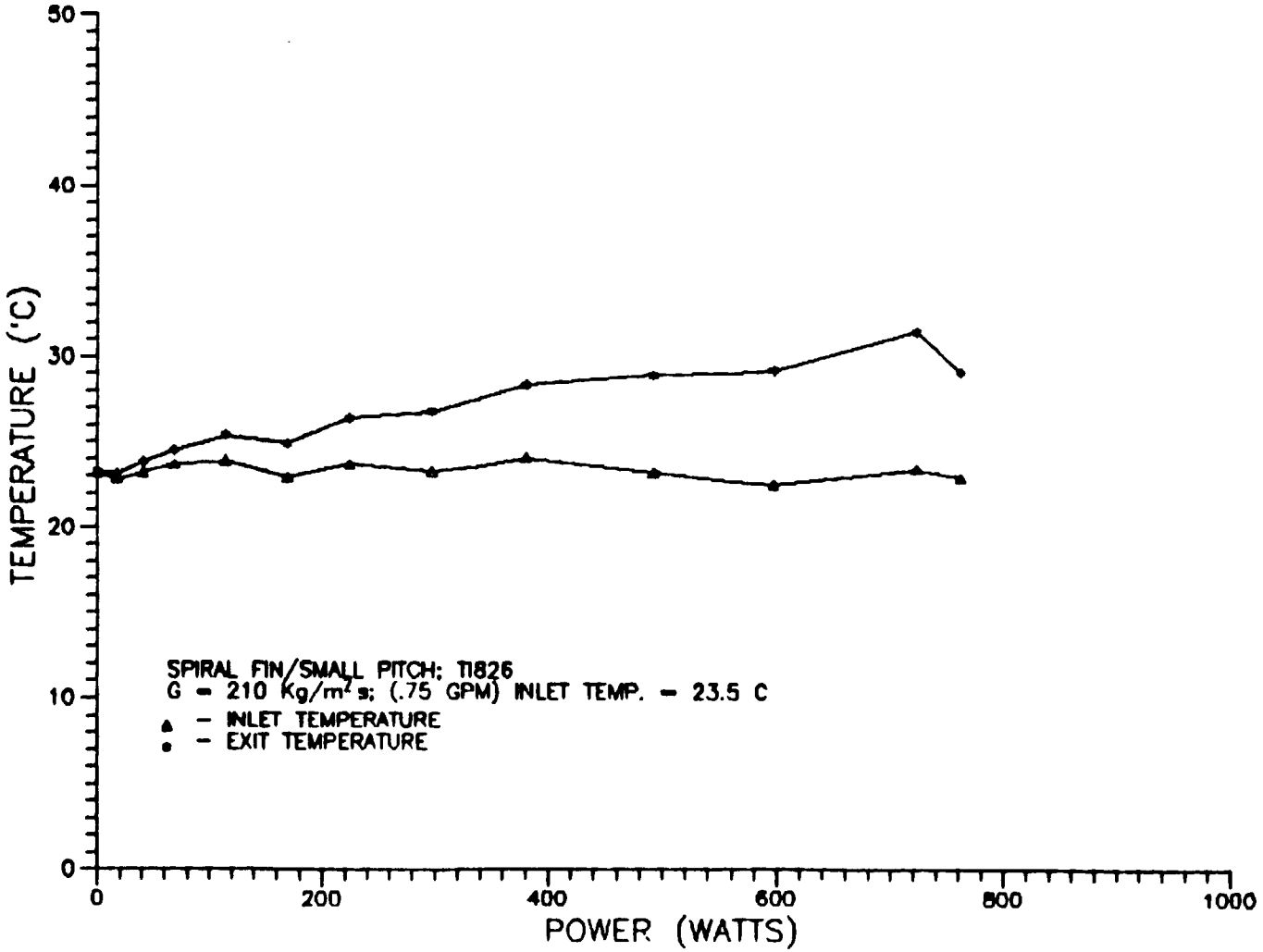
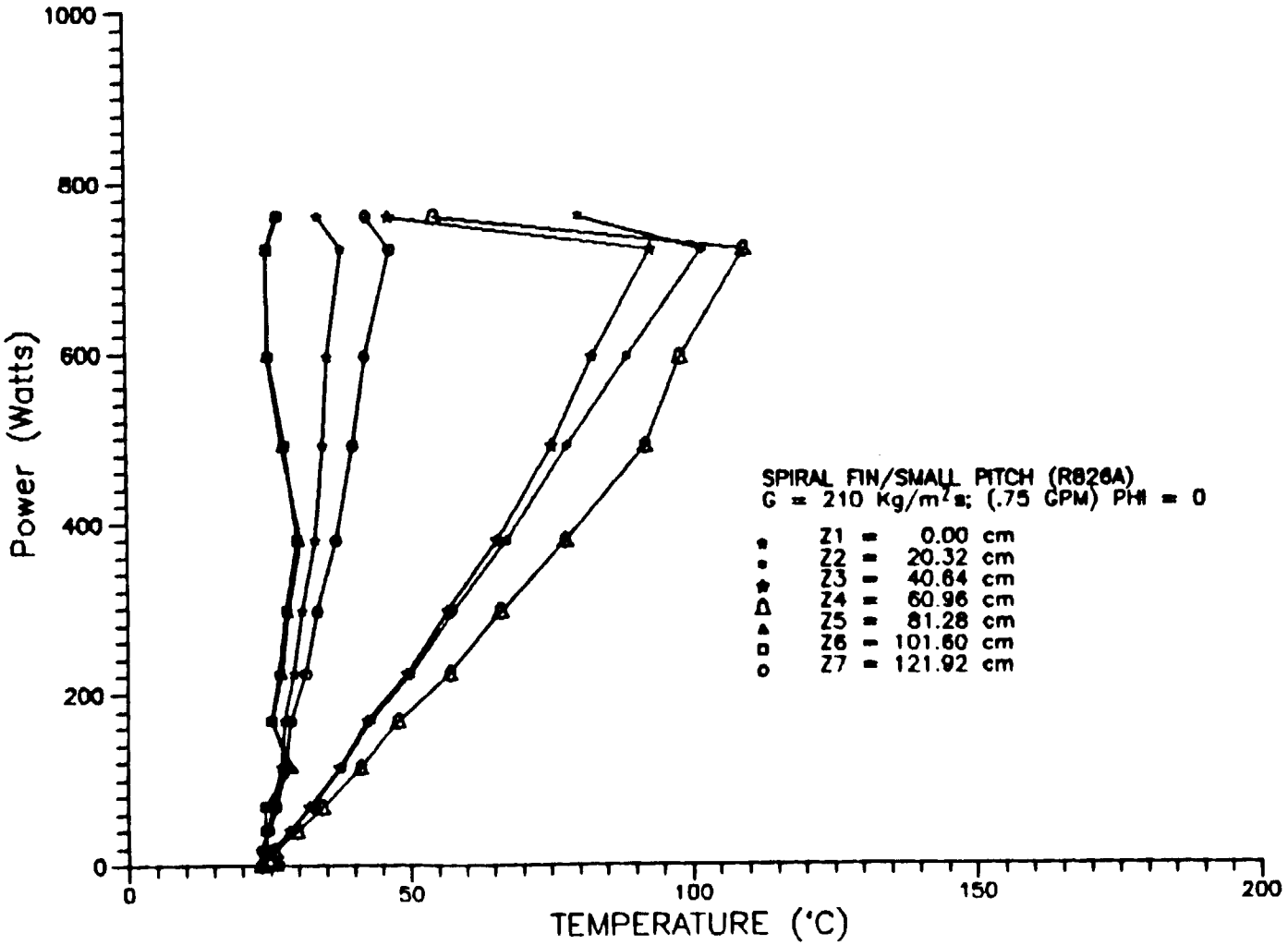
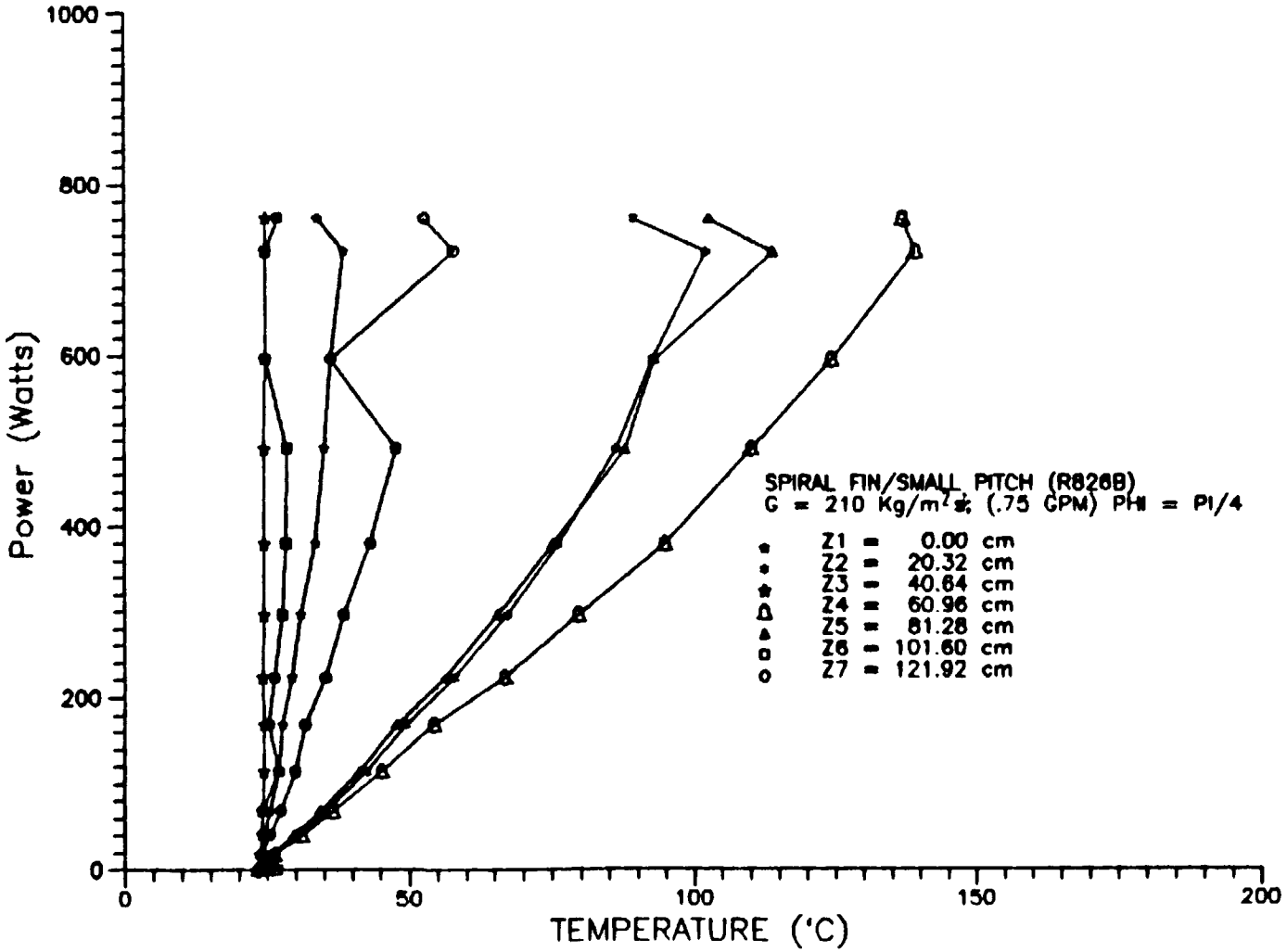
APPENDIX

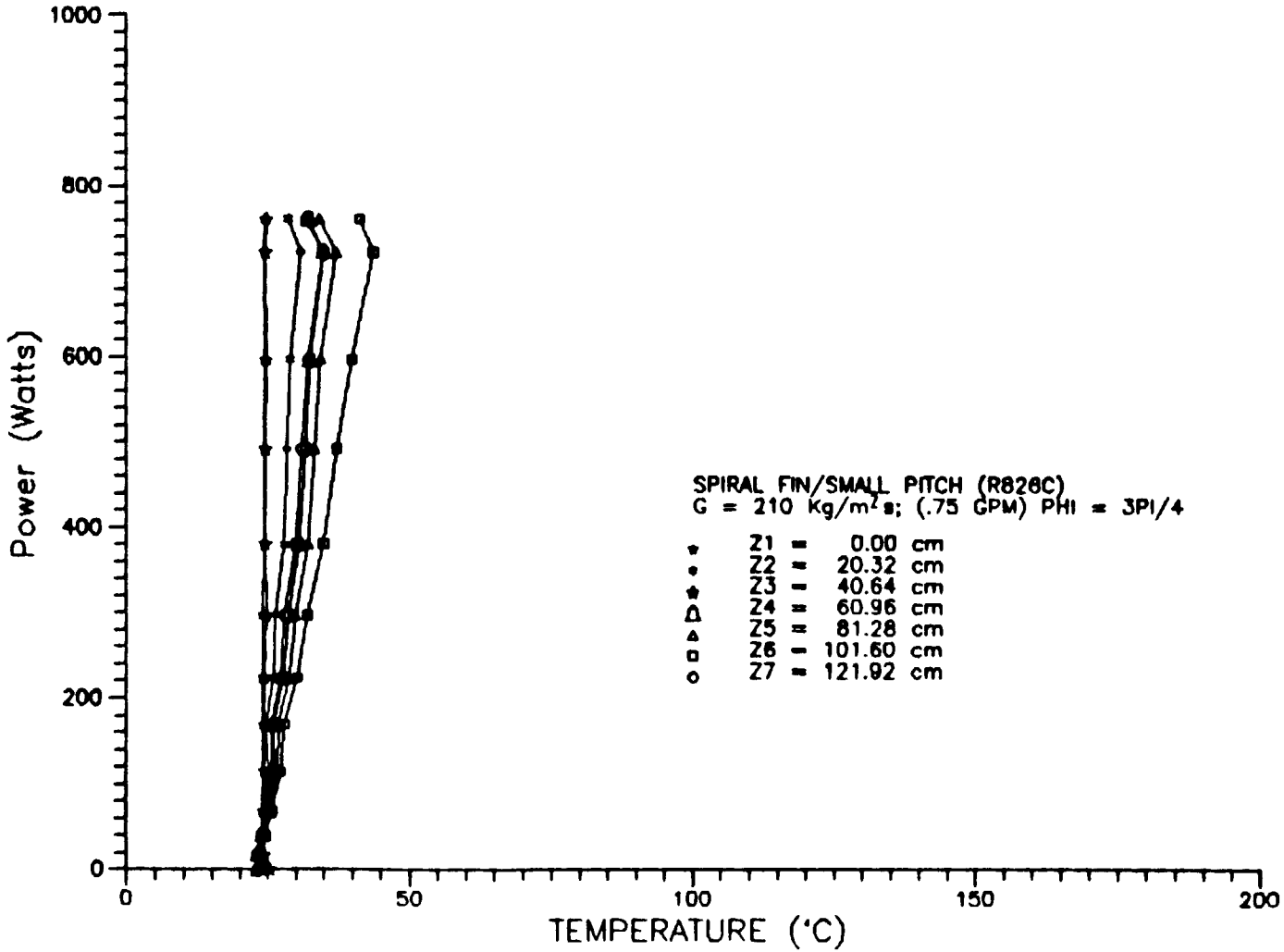
NOMENCLATURE

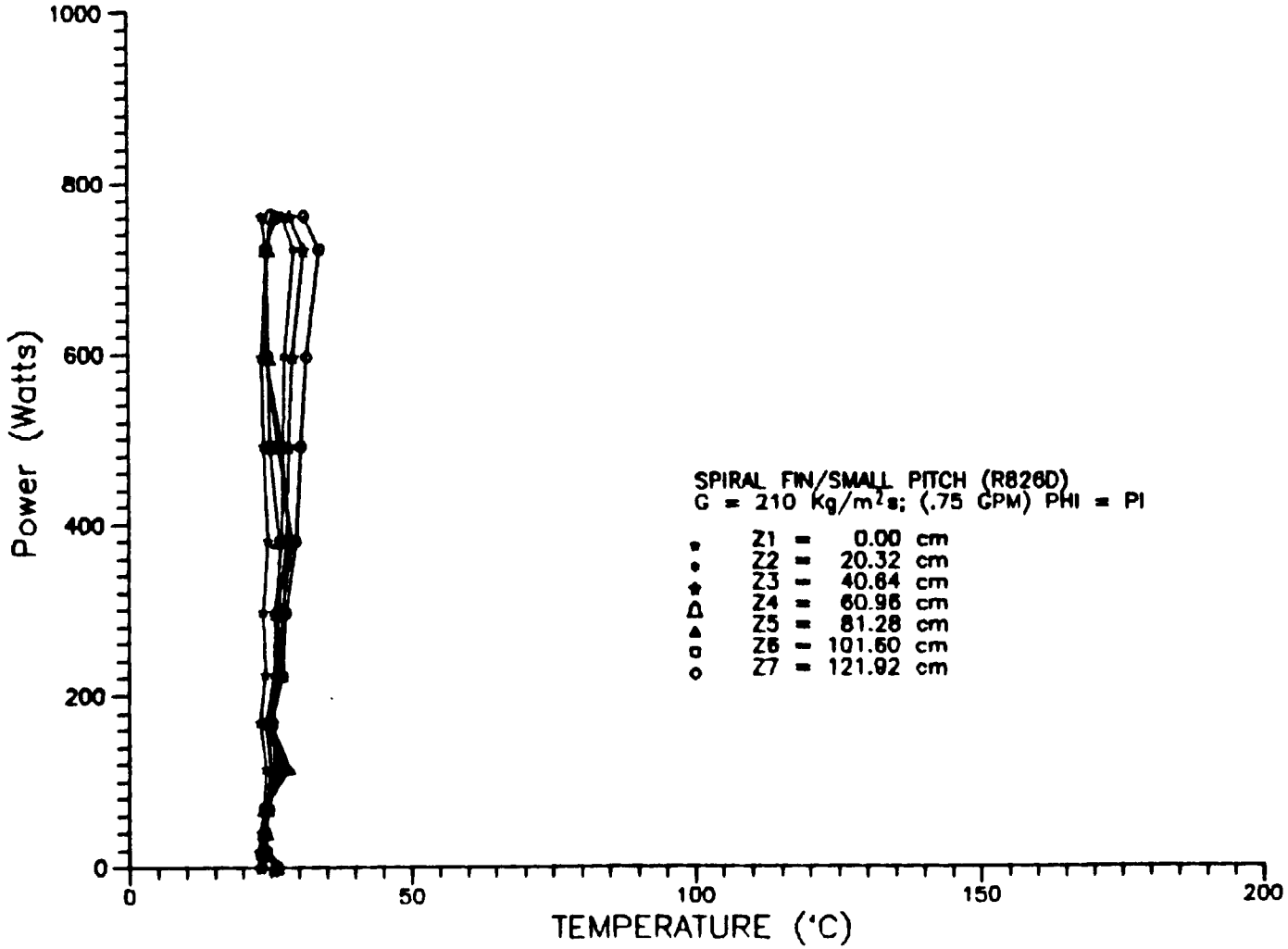
A(I)	Total power generation in the test section heater tape.
h1(J)	Test section inside wall heat transfer coefficient reduced from the measured local outside wall temperature.
HRAD	Estimated radiative heat transfer coefficient on the outside of the test section assembly.
I	Index for the seven axial locations where wall temperature measurements were made. In the data tables that follow, four of the seven locations for a given power level will be contained on the first page of the table and latter three of the seven locations will be contained on the second page.
J	Index for the four circumferential locations where wall temperature measurements were made (see Figures 4 and 5).
P_{meal}	Net power generation. Generally, P_{meal} is only approximate for the first two power levels of the table.
TF	Bulk fluid temperature, which varies with Z, and computed from the First Law of Thermodynamics.
T(I,J)	Measured local outside wall temperatures (see Figures 4 and 5) of the test section flow channel.
TO	Measured ambient temperature.
TW	Computed inside wall temperature using T(I,J) and TF. TF was computed from measured values of the inlet and outlet fluid temperatures. TW should be compared with TWI to assess the effect of errors in h due to the assumptions made in computing the net power generation.
TWI	Computed inside wall temperature using T(I,J) and TF. TF was computed from measured values of the inlet fluid temperature and the net power generation. TWI should be compared with TW to assess the effect of errors in h due to assumptions made in computing the net power generation.

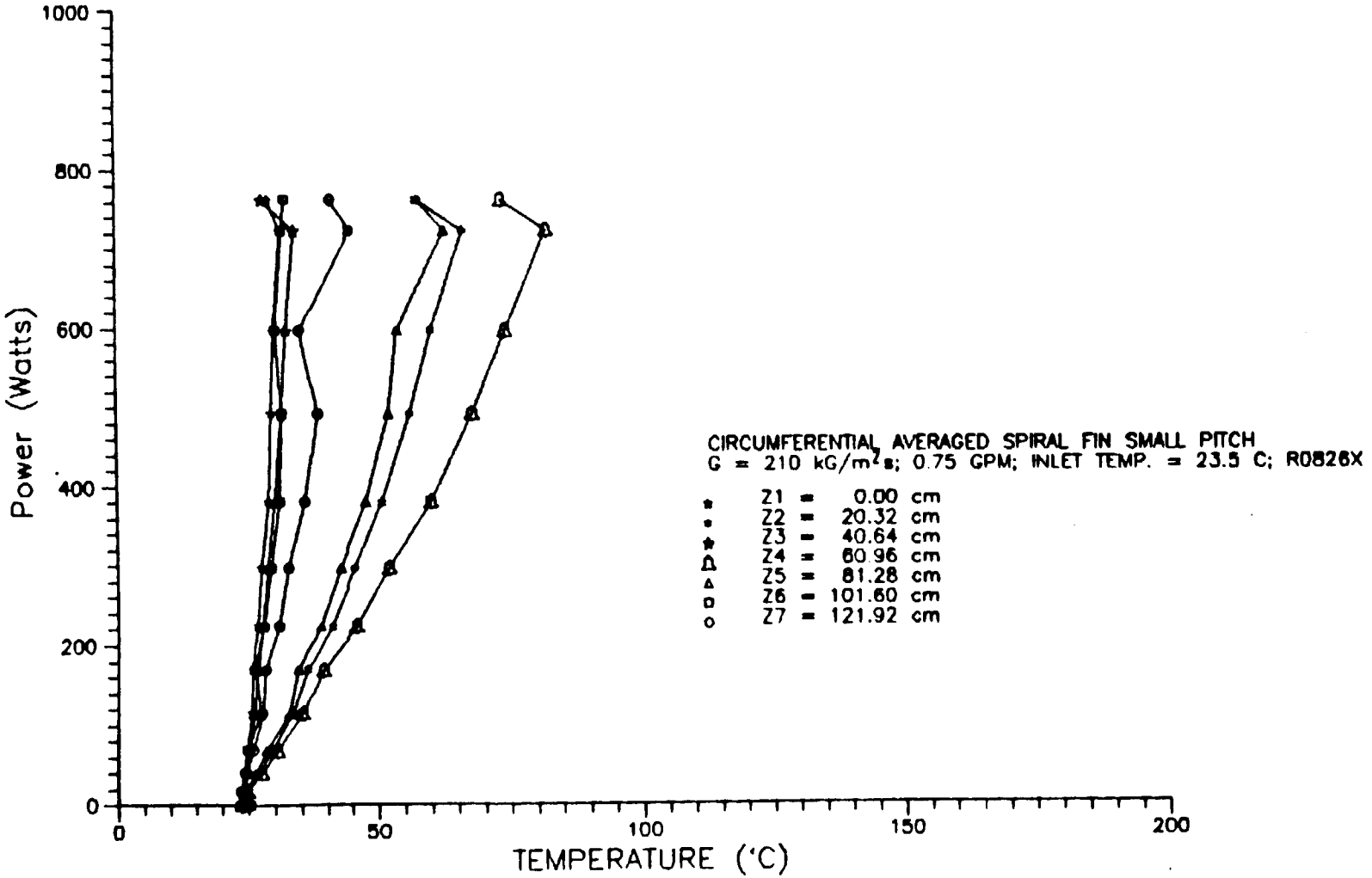

TEMPERATURE (°C)
50
40
30
20
10
0
0
200
400
600
800
1000
POWER (WATTS)
SPIRAL FIN/SMALL PITCH; TI826
G = 210 Kg/m² s; (.75 GPM) INLET TEMP. = 23.5 C
▲ - INLET TEMPERATURE
● - EXIT TEMPERATURE

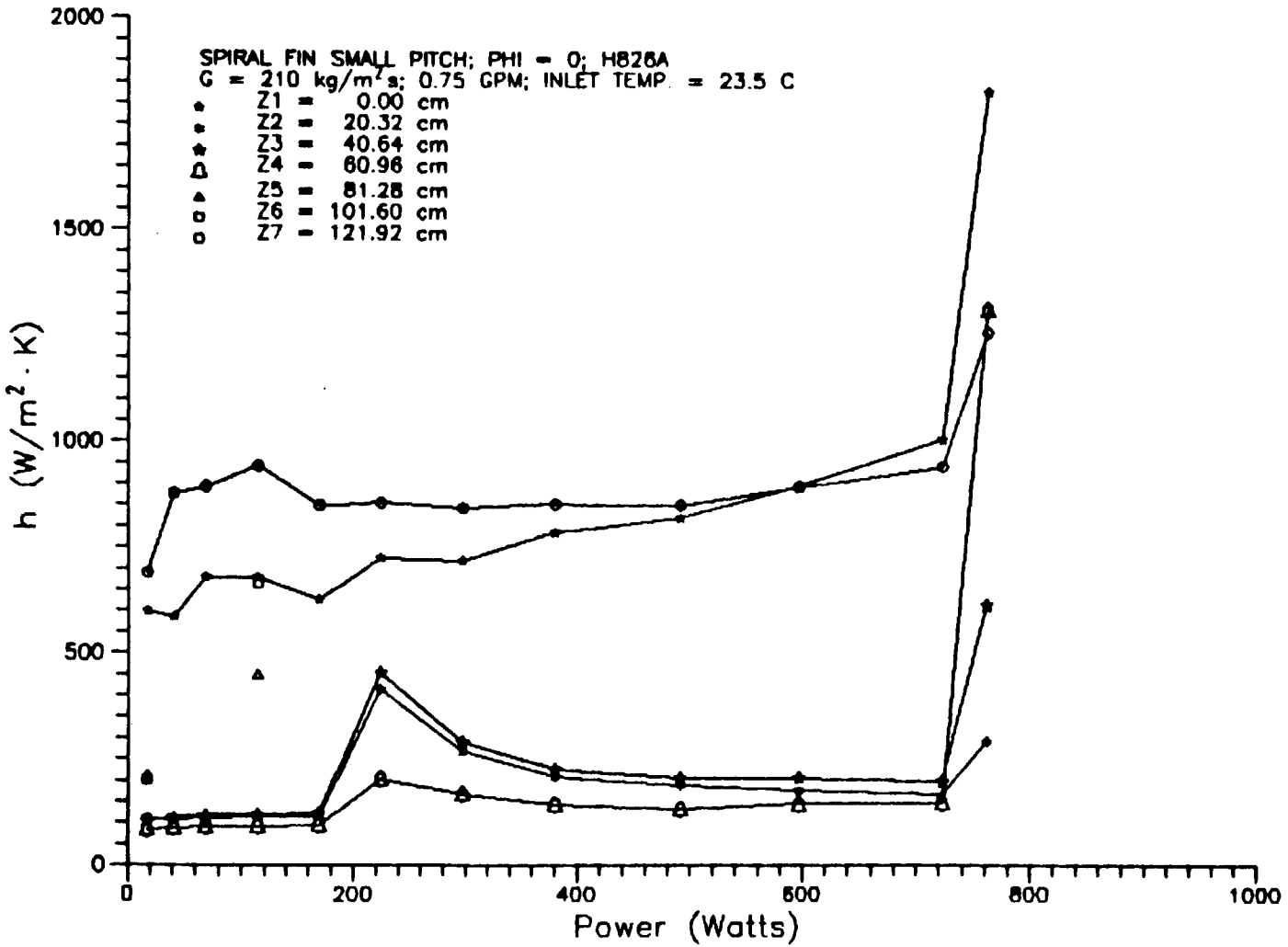

1000
800
600
400
200
0
Power (Watts)
0
50
100
150
200
TEMPERATURE (°C)
SPIRAL FIN/SMALL PITCH (R626A)
G = 210 Kg/m²s; (.75 GPM) PHI = 0
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

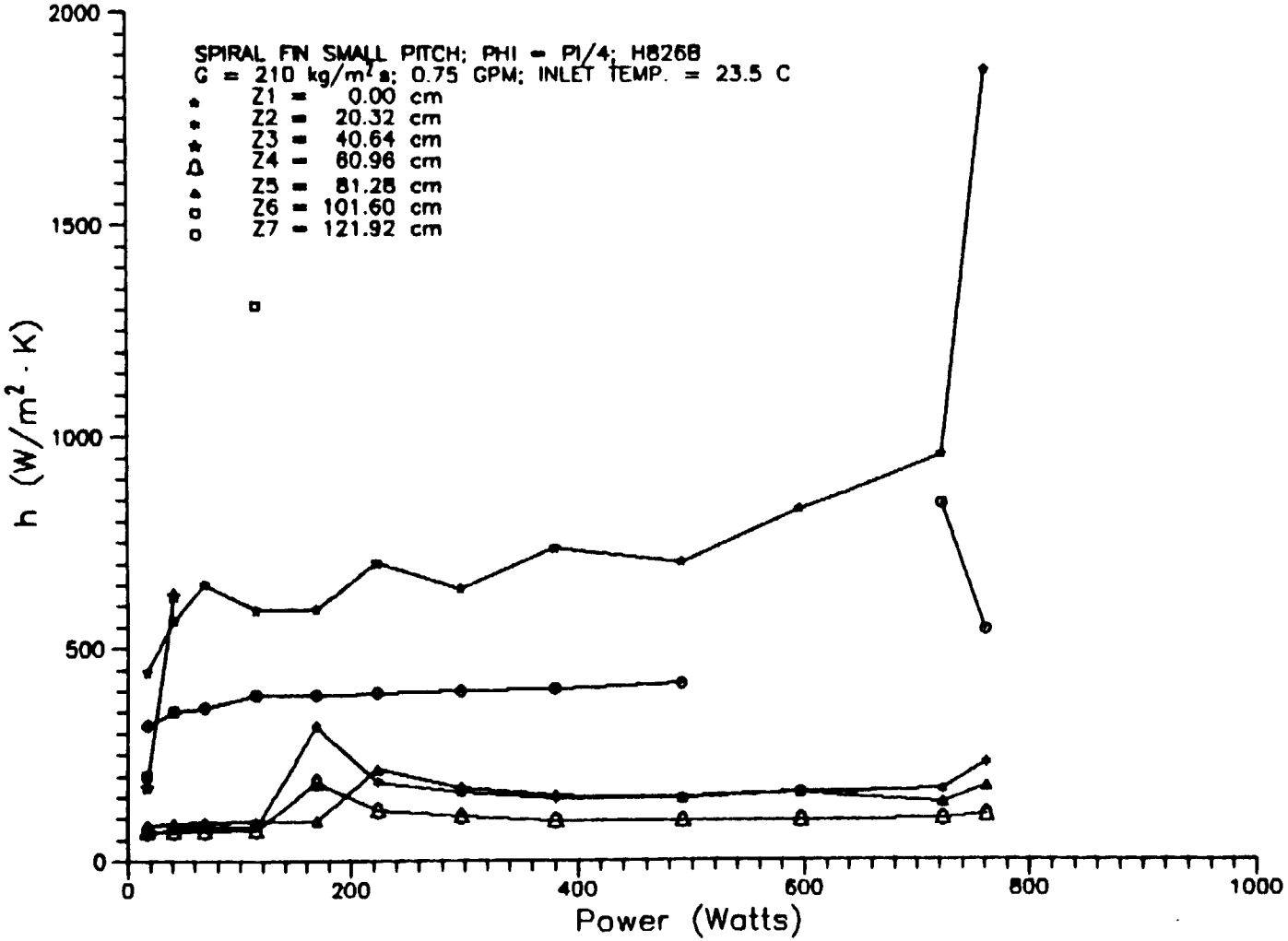

Power (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)
SPIRAL FIN/SMALL PITCH (R826B)
G = 210 Kg/m²s (.75 GPM) PHI = PI/4
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

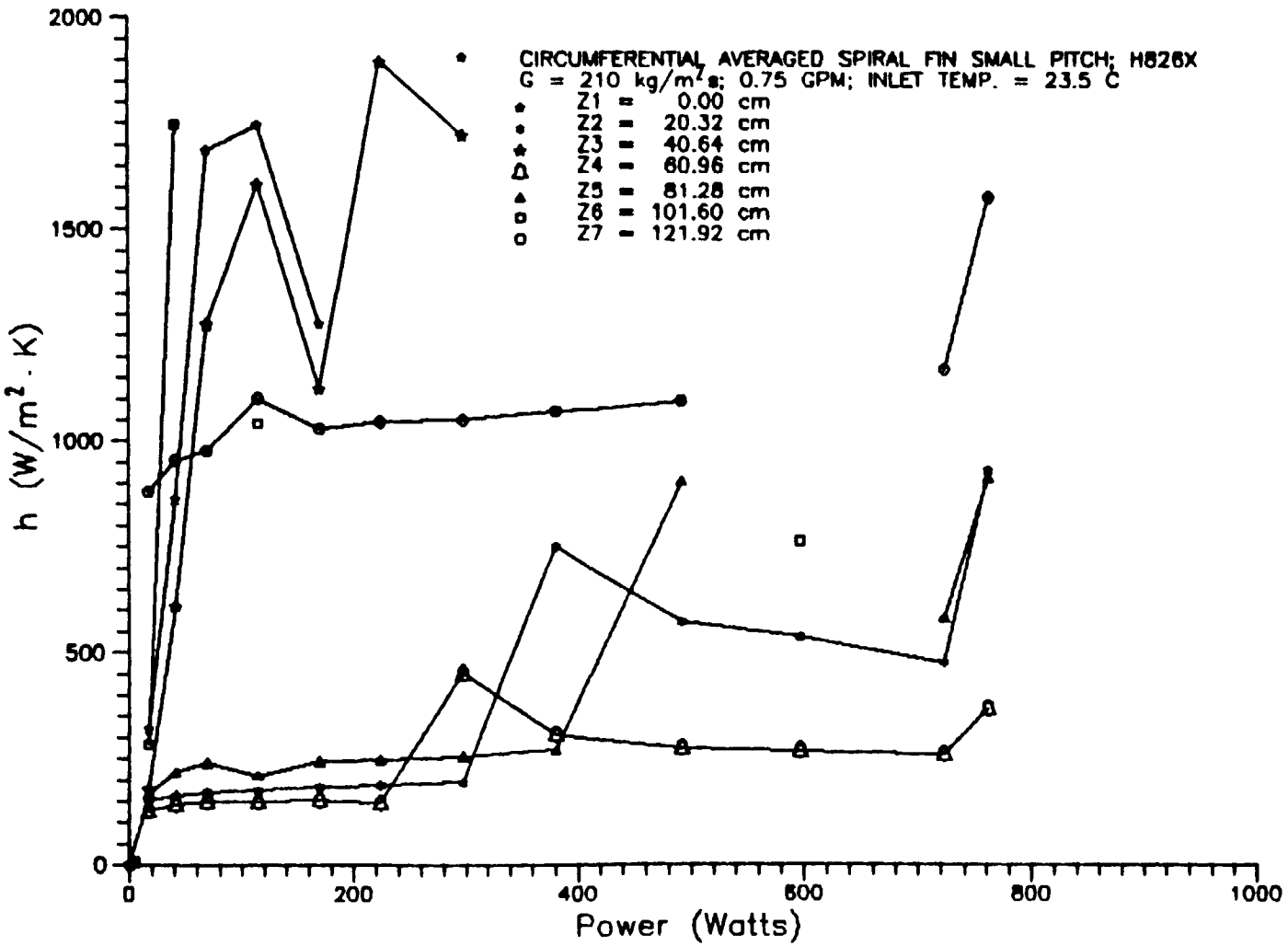

Power (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)
SPIRAL FIN/SMALL PITCH (R826C)
G = 210 Kg/m²s; (.75 GPM) PHI = 3PI/4
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

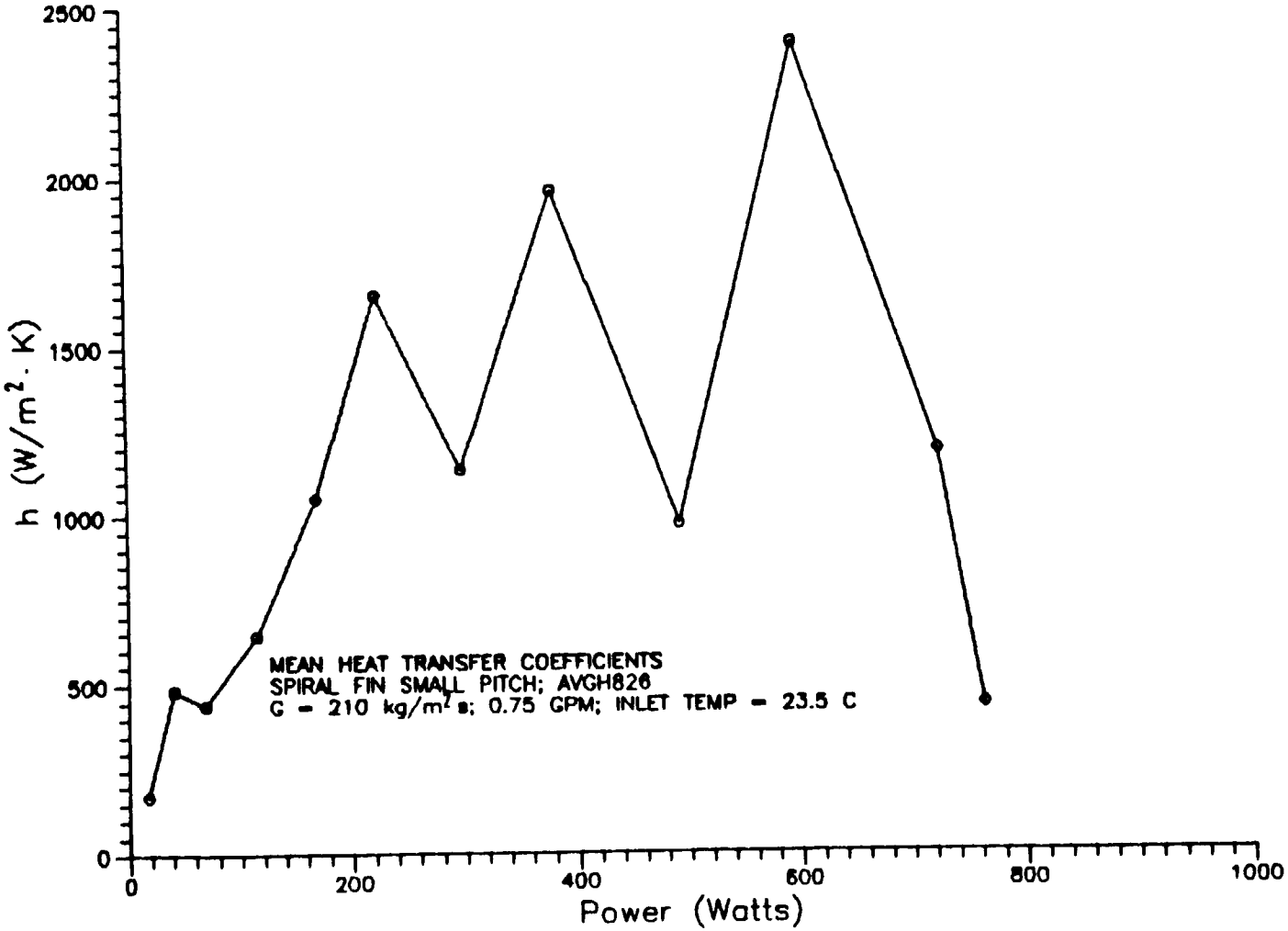

1000
800
600
400
200
0
Power (Watts)
0
50
100
150
200
TEMPERATURE (°C)
SPIRAL FIN/SMALL PITCH (R826D)
G = 210 Kg/m²s; (.75 GPM) PHI = PI
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm


1000
800
600
400
200
0
Power (Watts)
0
50
100
150
200
TEMPERATURE ('C)
CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH
G = 210 kG/m²s; 0.75 GPM; INLET TEMP. = 23.5 C; R0826X
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm


SPIRAL FIN SMALL PITCH; PHI = 0; H826A
G = 210 kg/m²s; 0.75 GPM; INLET TEMP. = 23.5 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m² · K)
Power (Watts)
0
500
1000
1500
2000
0
200
400
600
800
1000


SPIRAL FIN SMALL PITCH; PHI = PI/4; H8268
G = 210 kg/m² s; 0.75 GPM; INLET TEMP. = 23.5 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m² · K)
Power (Watts)
2000
1500
1000
500
0
0
200
400
600
800
1000


CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH; H826X
G = 210 kg/m²s; 0.75 GPM; INLET TEMP. = 23.5 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m².K)
2000
1500
1000
500
0
0
200
400
600
800
1000
Power (Watts)


2500
2000
1500
1000
500
0
h (W/m^2. K)
0
200
400
600
800
1000
Power (Watts)
MEAN HEAT TRANSFER COEFFICIENTS
SPIRAL FIN SMALL PITCH; AVGH826
G = 210 kg/m^2 s; 0.75 GPM; INLET TEMP = 23.5 C

H826A.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	.002	-1.292	-1.459	-1.702
17.38	598.943	108.801	105.189	83.486
41.05	585.423	108.002	110.294	87.365
68.75	679.762	111.851	116.922	89.988
114.30	677.706	113.617	119.808	92.021
169.21	626.791	116.062	122.325	93.892
223.85	724.712	413.605	453.555	201.854
297.37	716.341	266.571	289.303	166.246
380.32	784.508	208.262	226.050	143.344
491.72	818.922	188.648	206.352	132.340
596.77	896.805	175.959	206.620	144.505
723.04	1006.689	165.844	199.021	145.969
761.88	1828.965	292.793	615.065	1312.576

H826AA.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-2.243	-2.257	-2.388
17.39	209.139	200.101	688.960
41.05	2616.695	5173.565	874.917
68.75	-1385.997	-1144.645	891.305
114.30	448.990	663.276	940.819
169.21	-12873.260	-4326.278	847.943
223.85	42904.120	-3263.744	853.925
297.37	7545.632	-10219.650	840.227
380.32	6344.269	-11044.710	850.369
491.72	-1938.850	-1660.302	849.251
596.77	-1184.839	-1024.847	893.932
723.04	-997.186	-879.919	943.014
761.88	-1611.206	-1421.246	1259.370

H826B.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	.004	-.286	-2.196	-1.569
17.39	444.033	62.997	174.861	69.762
41.05	564.062	76.738	625.761	70.378
68.75	649.700	79.310	-2564.463	71.794
114.30	589.802	81.668	-1839.397	72.436
169.21	592.516	316.617	-8980.780	184.720
223.85	701.302	185.284	-1578.999	118.621
297.37	640.237	159.077	-1833.842	103.652
380.32	735.949	146.918	-1308.046	94.226
491.72	703.697	148.461	-1493.933	94.792
596.77	828.878	161.822	-1723.493	95.403
723.04	955.998	165.842	-1380.130	98.154
761.88	1863.675	229.765	-1675.449	106.542

H826BB.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-1.776	-2.258	-2.339
17.39	85.283	200.834	317.861
41.05	88.871	2612.734	351.847
68.75	90.350	-1212.926	359.832
114.30	92.944	1307.902	390.296
169.21	94.890	-4326.278	389.330
223.85	214.280	-2437.151	394.316
297.37	171.655	-6664.030	398.805
380.32	155.125	-2398.635	404.262
491.72	145.621	-2032.450	415.974
596.77	160.773	-985.591	2985.372
723.04	136.234	-863.679	840.506
761.88	174.089	-1463.526	543.348

H826X.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-1.939	1.815	-2.175	-2.002
17.39	319.371	153.084	176.535	127.613
41.05	861.381	163.113	609.781	144.074
68.75	1686.574	171.461	1276.054	150.892
114.30	1745.755	176.828	1606.575	148.955
169.21	1276.723	183.442	1123.468	152.872
223.85	2064.750	187.362	1896.037	147.415
297.36	1903.619	193.912	1721.875	450.818
380.32	2424.333	749.798	2678.065	307.697
491.72	2369.693	572.624	2420.940	276.375
596.77	2423.969	537.722	2315.699	269.622
723.04	3593.873	476.491	3671.437	261.426
761.88	23781.770	928.988	-3631.676	369.875

H826XX.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-2.169	-2.250	-1.985
17.39	167.232	284.085	879.548
41.05	217.887	1746.640	953.831
68.75	240.513	-5081.734	977.058
114.30	209.949	1040.453	1099.747
169.21	243.476	5170.898	1029.128
223.85	246.460	8444.916	1044.621
297.36	254.224	4026.941	1048.361
380.32	270.090	8418.308	1069.768
491.72	904.623	-59873.660	1094.479
596.77	6339.330	765.148	-2507.707
723.04	581.506	-2487.771	1169.074
761.88	911.666	-6543.325	1576.679

SPIRAL FIN SMALL PITCH; G = 210 kg/m s; PHI = 0

R826A.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	6.23		719.488	5.91	296.35	296.45	296.41	296.45	296.	
.00	6.23		371.433	5.91	296.37	296.56	296.52	296.45	296.	
.00	6.23		384.597	5.91	296.38	296.57	296.53	296.45	296.	
.00	6.23		358.922	5.91	296.40	296.60	296.56	296.45	296.	
17.38	19.93		615.218	5.90	295.95	296.32	296.32	296.28	296.	
17.38	19.93		113.721	5.93	296.00	298.03	298.02	296.28	298.	
17.38	19.93		110.082	5.93	296.06	298.15	298.14	296.28	298.	
17.38	19.93		87.896	5.94	296.11	298.73	298.72	296.28	298.	
41.05	37.37		477.891	5.95	296.35	297.25	297.31	296.95	297.	
41.05	37.37		89.707	6.01	296.45	301.26	301.31	296.95	301.	
41.05	37.37		91.611	6.01	296.55	301.26	301.31	296.95	301.	
41.05	37.37		72.981	6.03	296.65	302.56	302.61	296.95	302.	
68.75	49.83		441.773	6.00	296.85	298.15	298.33	297.65	298.	
68.75	49.83		73.945	6.10	296.98	304.76	304.94	297.65	305.	
68.75	49.83		77.257	6.09	297.12	304.56	304.74	297.65	305.	
68.75	49.83		59.820	6.13	297.25	306.86	307.04	297.65	307.	
114.30	93.43		496.576	6.06	297.05	299.22	299.44	298.55	300.	
114.30	93.43		84.665	6.22	297.30	310.04	310.26	298.55	310.	
114.30	93.43		89.222	6.22	297.55	309.63	309.86	298.55	310.	
114.30	93.43		68.942	6.28	297.80	313.44	313.66	298.55	314.	
169.21	124.57		413.849	6.05	296.05	299.52	299.94	298.05	300.	
169.21	124.57		77.878	6.28	296.38	314.84	315.26	298.05	316.	
169.21	124.57		82.028	6.27	296.72	314.24	314.66	298.05	315.	
169.21	124.57		63.332	6.36	297.05	319.75	320.17	298.05	320.	
223.85	168.17		488.021	6.14	296.85	300.83	301.36	299.55	302.	
223.85	168.17		283.182	6.47	314.80	321.65	322.19	299.55	323.	
223.85	168.17		310.385	6.46	314.80	321.05	321.59	299.55	322.	
223.85	168.17		138.999	6.58	314.80	328.76	329.30	299.55	330.	
297.37	218.00		470.777	6.18	296.45	301.79	302.54	299.95	303.	
297.37	218.00		178.065	6.61	314.80	328.93	329.67	299.95	331.	
297.37	218.00		193.122	6.60	314.80	327.83	328.57	299.95	329.	
297.37	218.00		111.620	6.75	314.80	337.34	338.08	299.95	339.	
380.32	267.82		495.167	6.29	297.25	303.49	304.52	301.55	306.	
380.32	267.82		133.596	6.85	314.80	337.94	338.96	301.55	340.	
380.32	267.82		144.883	6.82	314.80	336.13	337.16	301.55	338.	
380.32	267.82		92.405	7.03	314.80	348.25	349.27	301.55	350.	
491.72	355.02		529.853	6.34	296.45	304.18	305.45	302.15	307.	
491.72	355.02		124.011	7.06	314.80	347.84	349.11	302.15	351.	
491.72	355.02		135.510	7.01	314.80	345.04	346.30	302.15	348.	
491.72	355.02		87.442	7.30	314.80	361.66	362.92	302.15	365.	
596.77	417.31		561.887	6.37	295.75	304.32	305.95	302.45	308.	
596.77	417.31		112.029	7.26	314.80	357.79	359.41	302.45	362.	
596.77	417.31		131.298	7.15	314.80	351.48	353.11	302.45	355.	
596.77	417.31		92.261	7.43	314.80	367.00	368.63	302.45	371.	
723.04	504.51		629.188	6.52	296.65	305.90	307.88	304.75	311.	
723.04	504.51		105.317	7.62	314.80	370.09	372.06	304.75	375.	
723.04	504.51		126.097	7.46	314.80	360.98	362.95	304.75	366.	
723.04	504.51		92.868	7.76	314.80	377.50	379.47	304.75	382.	
761.88	386.17		829.988	6.34	296.15	301.52	304.55	302.35	307.	
761.88	386.17		134.323	7.11	314.80	347.98	351.01	302.35	353.	
761.88	386.17		279.937	6.54	298.22	314.14	317.16	302.35	319.	
761.88	386.17		598.530	6.67	314.80	322.25	325.27	302.35	327.	

SPIRAL FIN SMALL PITCH; G = 210 kg/m s; PHI = 0

R826AA.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	6.23		25.154	5.95	296.42	299.27	299.23	296.45	299.	
.00	6.23		22.802	5.96	296.43	299.58	299.54	296.45	299.	
.00	6.23		-123941.300	5.91	296.45	296.45	296.41	296.45	296.	
17.39	19.93		216.667	5.91	296.16	297.22	297.22	296.29	297.	
17.39	19.93		207.517	5.92	296.22	297.33	297.32	296.29	297.	
17.39	19.93		709.158	5.91	296.27	296.59	296.59	296.29	296.	
41.05	37.37		2133.160	5.94	296.75	296.95	297.01	296.95	297.	
41.05	37.37		4217.304	5.94	296.85	296.95	297.01	296.95	297.	
41.05	37.37		715.119	5.95	296.95	297.55	297.61	296.95	297.	
68.75	50.52		-909.938	5.98	297.39	296.75	296.92	297.66	297.	
68.75	50.52		-751.487	5.98	297.53	296.75	296.92	297.66	297.	
68.75	50.52		588.029	6.00	297.66	298.65	298.82	297.66	299.	
114.30	94.11		332.478	6.09	298.06	301.32	301.54	298.56	302.	
114.30	94.11		490.551	6.08	298.31	300.52	300.74	298.56	301.	
114.30	94.11		695.389	6.07	298.56	300.12	300.34	298.56	300.	
169.21	125.26		-8525.684	6.01	297.39	297.22	297.64	298.06	298.	
169.21	125.26		-2865.273	6.01	297.73	297.22	297.64	298.06	298.	
169.21	125.26		563.591	6.06	298.06	300.63	301.04	298.06	301.	
223.85	168.85		28959.860	6.11	298.66	298.72	299.25	299.56	300.	
223.85	168.85		-2202.252	6.10	299.11	298.22	298.75	299.56	299.	
223.85	168.85		578.337	6.17	299.56	302.93	303.46	299.56	304.	
297.37	218.00		4951.715	6.14	298.78	299.29	300.04	299.95	301.	
297.37	218.00		-6705.255	6.14	299.37	298.99	299.73	299.95	301.	
297.37	218.00		553.081	6.22	299.95	304.50	305.24	299.95	306.	
380.32	267.82		3999.546	6.25	300.12	300.89	301.91	301.56	303.	
380.32	267.82		-6961.134	6.24	300.83	300.39	301.41	301.56	303.	
380.32	267.82		537.686	6.35	301.55	307.30	308.32	301.56	310.	
491.72	355.02		-1251.167	6.24	300.25	296.97	298.24	302.26	300.	
491.72	355.02		-1071.572	6.24	301.20	297.38	298.64	302.26	300.	
491.72	355.02		550.525	6.43	302.15	309.59	310.86	302.26	313.	
596.77	417.31		-740.007	6.21	300.22	293.71	295.33	302.55	298.	
596.77	417.31		-640.100	6.21	301.33	293.81	295.43	302.55	298.	
596.77	417.31		561.185	6.48	302.45	311.03	312.65	302.55	315.	
723.04	504.44		-621.157	6.31	302.06	292.69	294.66	304.76	297.	
723.04	504.44		-548.123	6.31	303.41	292.79	294.76	304.76	298.	
723.04	504.44		590.568	6.66	304.76	314.62	316.59	304.76	319.	
761.88	379.94		-718.158	6.23	300.32	294.21	297.28	302.35	299.	
761.88	379.94		-633.518	6.23	301.33	294.41	297.48	302.35	299.	
761.88	379.94		563.411	6.48	302.35	310.13	313.20	302.35	315.	

SPIRAL FIN SMALL PITCH; G = 210 kg/m s; PHI = PI/4

R826B.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	6.24		721.109	5.91	296.35	296.45	296.41	296.45	296.
.00	6.24		754.568	5.91	296.37	296.46	296.42	296.45	296.
.00	6.24		34.793	5.94	296.38	298.45	298.41	296.45	298.
.00	6.24		443.738	5.91	296.40	296.56	296.52	296.45	296.
17.39	19.96		457.021	5.90	295.95	296.45	296.45	296.29	296.
17.39	19.96		66.871	5.95	296.00	299.45	299.44	296.29	299.
17.39	19.96		181.583	5.92	296.06	297.33	297.32	296.29	297.
17.39	19.96		73.882	5.94	296.11	299.23	299.22	296.29	299.
41.05	37.42		461.126	5.95	296.35	297.29	297.34	296.95	297.
41.05	37.42		64.359	6.04	296.45	303.16	303.22	296.95	303.
41.05	37.42		511.810	5.95	296.55	297.39	297.45	296.95	297.
41.05	37.42		59.230	6.05	296.65	303.94	304.00	296.95	304.
68.75	50.59		428.714	6.00	296.85	298.21	298.38	297.66	298.
68.75	50.59		53.664	6.14	296.99	307.86	308.03	297.66	308.
68.75	50.59		-1685.954	5.98	297.12	296.77	296.94	297.66	297.
68.75	50.59		48.755	6.17	297.26	309.23	309.40	297.66	309.
114.30	94.24		436.131	6.06	297.05	299.54	299.76	298.56	300.
114.30	94.24		61.857	6.30	297.30	314.88	315.10	298.56	315.
114.30	94.24		-1354.317	6.02	297.55	296.75	296.97	298.56	297.
114.30	94.24		55.097	6.34	297.80	317.54	317.76	298.56	318.
169.21	125.42		393.975	6.05	296.05	299.72	300.14	298.06	300.
169.21	125.42		215.434	6.39	314.80	321.52	321.93	298.06	322.
169.21	125.42		-5951.300	6.00	296.72	296.48	296.89	298.06	297.
169.21	125.42		126.330	6.46	314.80	326.26	326.67	298.06	327.
223.85	169.08		474.862	6.14	296.85	300.96	301.49	299.56	302.
223.85	169.08		128.407	6.60	314.80	330.00	330.52	299.56	331.
223.85	169.08		-1064.931	6.07	297.75	295.92	296.45	299.56	297.
223.85	169.08		82.771	6.74	314.80	338.38	338.90	299.56	339.
297.37	218.29		421.480	6.19	296.45	302.43	303.17	299.95	304.
297.37	218.29		107.015	6.77	314.80	338.34	339.08	299.95	340.
297.37	218.29		-1202.316	6.09	297.62	295.52	296.26	299.95	297.
297.37	218.29		70.258	6.98	314.80	350.66	351.40	299.95	352.
380.32	268.18		465.223	6.30	297.25	303.90	304.92	301.56	306.
380.32	268.18		94.799	7.01	314.80	347.45	348.47	301.56	350.
380.32	268.18		-823.438	6.16	298.68	294.92	295.94	301.56	297.
380.32	268.18		61.323	7.32	314.80	365.27	366.29	301.56	367.
491.72	355.50		456.097	6.37	296.45	305.45	306.71	302.26	309.
491.72	355.50		98.038	7.22	314.80	356.65	357.91	302.26	360.
491.72	355.50		-964.354	6.19	298.35	294.09	295.36	302.26	297.
491.72	355.50		63.138	7.64	314.80	379.78	381.04	302.26	383.
596.77	417.86		520.113	6.39	295.75	305.02	306.64	302.55	309.
596.77	417.86		103.278	7.34	314.80	361.49	363.12	302.55	365.
596.77	417.86		-1077.799	6.21	297.98	293.51	295.13	302.55	297.
596.77	417.86		61.484	7.92	314.80	393.24	394.86	302.55	397.
723.04	505.11		598.292	6.53	296.66	306.40	308.38	304.76	311.
723.04	505.11		105.441	7.62	314.80	370.09	372.06	304.76	375.
723.04	505.11		-860.823	6.31	299.36	292.59	294.56	304.76	297.
723.04	505.11		62.997	8.33	314.80	407.34	409.31	304.76	412.
761.88	380.44		833.207	6.34	296.25	301.52	304.58	302.35	307.
761.88	380.44		104.067	7.27	314.80	356.99	360.05	302.35	362.
761.88	380.44		-747.479	6.20	298.28	292.41	295.47	302.35	297.
761.88	380.44		48.811	8.15	314.80	404.75	407.82	302.35	410.

SPIRAL FIN SMALL PITCH; G = 210 kg/m s; PHI = PI/4

R826BB.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	6.23		468.168	5.91	296.42	296.57	296.53	296.45	296.	
.00	6.23		20.415	5.96	296.43	299.95	299.91	296.45	299.	
.00	6.23		-73590.160	5.91	296.45	296.45	296.41	296.45	296.	
17.39	19.93		89.730	5.94	296.16	298.73	298.72	296.29	298.	
17.39	19.93		208.268	5.92	296.22	297.32	297.32	296.29	297.	
17.39	19.93		328.452	5.91	296.27	296.97	296.97	296.29	297.	
41.05	37.37		74.239	6.03	296.75	302.56	302.61	296.95	302.	
41.05	37.37		2130.909	5.94	296.85	297.05	297.11	296.95	297.	
41.05	37.37		288.695	5.97	296.95	298.44	298.50	296.95	298.	
68.75	50.52		60.909	6.13	297.39	306.96	307.13	297.66	307.	
68.75	50.52		-796.409	5.98	297.53	296.79	296.96	297.66	297.	
68.75	50.52		238.286	6.03	297.66	300.11	300.28	297.66	300.	
114.30	94.11		70.154	6.28	298.06	313.54	313.76	298.56	314.	
114.30	94.11		965.688	6.06	298.31	299.43	299.65	298.56	300.	
114.30	94.11		289.460	6.11	298.56	302.31	302.53	298.56	303.	
169.21	125.26		64.364	6.36	297.39	319.85	320.27	298.06	321.	
169.21	125.26		-2865.273	6.01	297.73	297.22	297.64	298.06	298.	
169.21	125.26		259.586	6.11	298.06	303.63	304.04	298.06	304.	
223.85	168.85		148.060	6.57	314.80	327.96	328.49	299.56	329.	
223.85	168.85		-1644.091	6.10	299.11	297.92	298.45	299.56	299.	
223.85	168.85		267.885	6.23	299.56	306.83	307.36	299.56	308.	
297.37	218.00		115.202	6.74	314.80	336.64	337.38	299.95	338.	
297.37	218.00		-4371.678	6.14	299.37	298.79	299.53	299.95	300.	
297.37	218.00		263.299	6.30	299.95	309.50	310.25	299.95	311.	
380.32	267.82		99.880	6.98	314.80	345.75	346.77	301.56	348.	
380.32	267.82		-1510.672	6.22	300.83	298.79	299.81	301.56	301.	
380.32	267.82		256.368	6.45	301.55	313.61	314.63	301.56	316.	
491.72	355.02		96.063	7.24	314.80	357.45	358.72	302.26	360.	
491.72	355.02		-1312.096	6.25	301.20	298.08	299.34	302.26	301.	
491.72	355.02		270.407	6.56	302.15	317.30	318.57	302.26	320.	
596.77	417.31		102.481	7.34	314.80	361.80	363.42	302.55	366.	
596.77	417.31		-615.526	6.21	301.33	293.51	295.13	302.55	297.	
596.77	417.31		1870.804	6.39	302.45	305.02	306.65	302.55	309.	
723.04	504.44		86.759	7.84	314.80	381.90	383.88	304.76	387.	
723.04	504.44		-537.981	6.31	303.41	292.59	294.56	304.76	297.	
723.04	504.44		527.827	6.85	314.80	325.83	327.81	304.76	331.	
761.88	379.94		78.995	7.51	314.80	370.31	373.38	302.35	375.	
761.88	379.94		-652.394	6.23	301.33	294.61	297.68	302.35	300.	
761.88	379.94		243.660	6.64	302.35	320.34	323.41	302.35	325.	

CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH; H826X

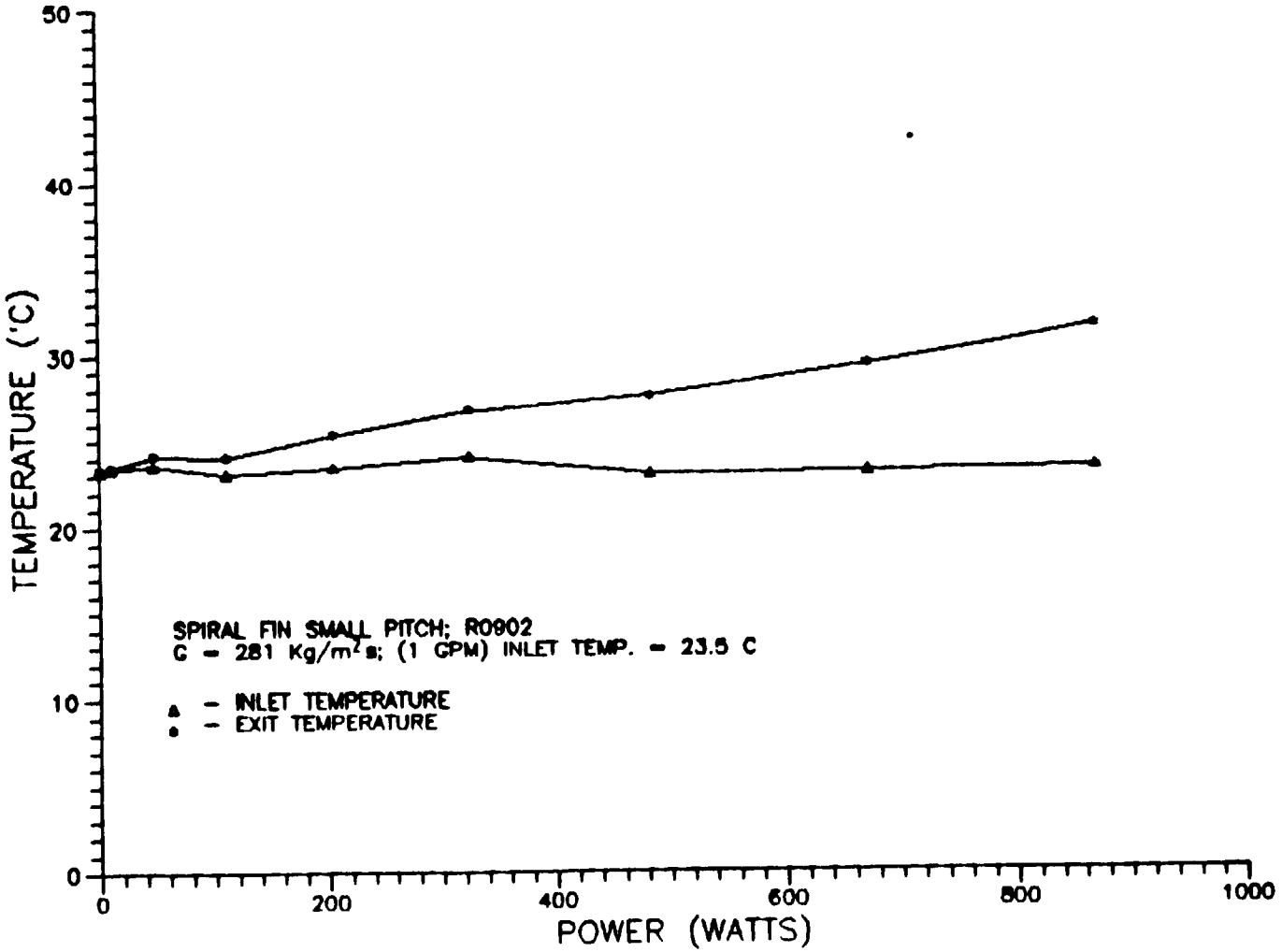
R826X.TER

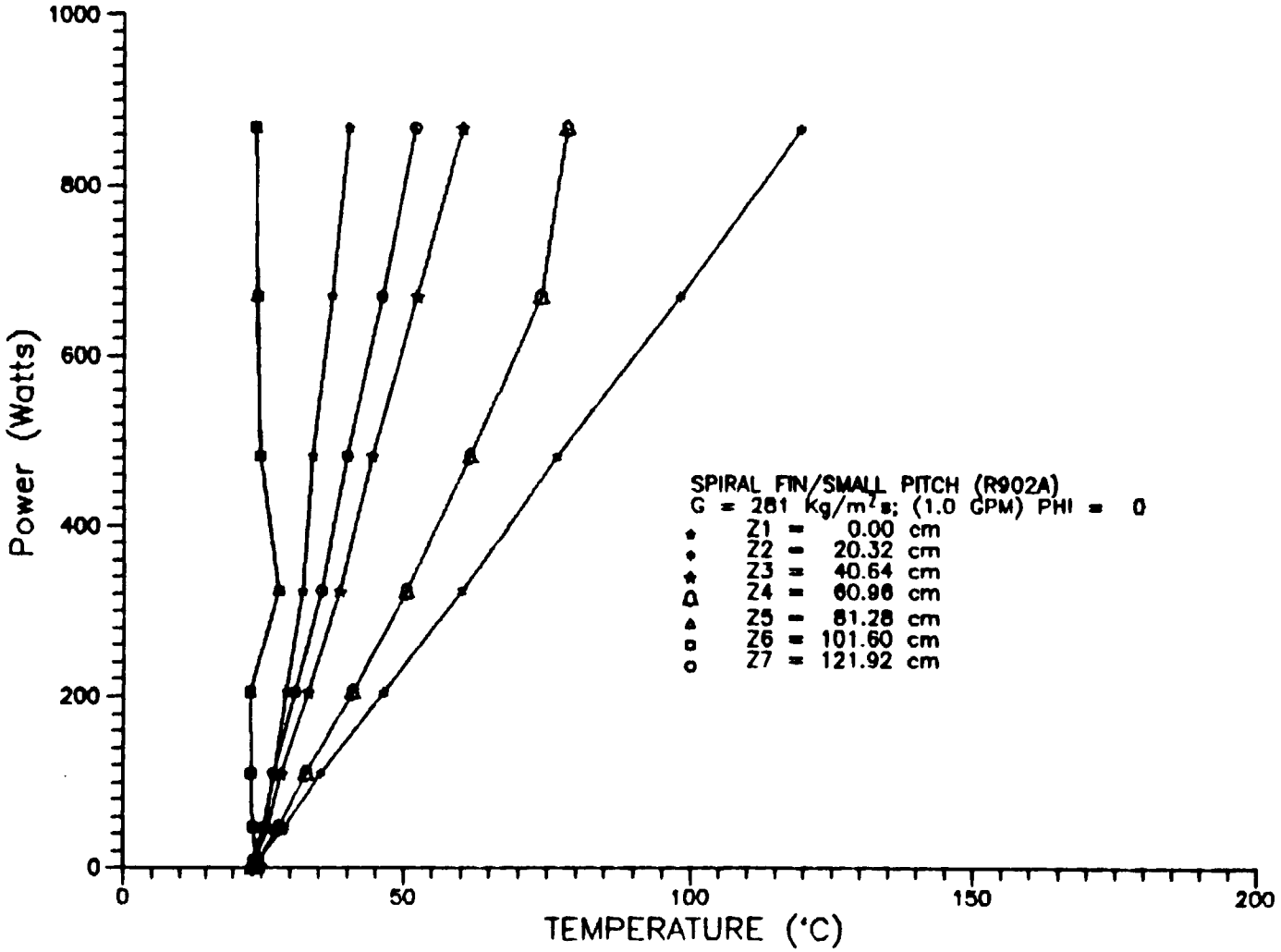
A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	6.23		104.494	5.92	296.35	297.04	297.00	296.45	297.	
.00	6.23		1553.354	5.91	296.37	296.41	296.37	296.45	296.	
.00	6.23		44.758	5.93	296.38	297.99	297.95	296.45	297.	
.00	6.23		168.894	5.91	296.40	296.83	296.79	296.45	296.	
17.39	19.93		328.968	5.91	295.95	296.65	296.65	296.29	296.	
17.39	19.93		158.975	5.92	296.00	297.45	297.45	296.29	297.	
17.39	19.93		183.073	5.92	296.06	297.31	297.31	296.29	297.	
17.39	19.93		133.054	5.92	296.11	297.84	297.84	296.29	297.	
41.05	37.37		702.290	5.94	296.35	296.96	297.02	296.95	297.	
41.05	37.37		134.540	5.98	296.45	299.66	299.71	296.95	299.	
41.05	37.37		498.121	5.95	296.55	297.42	297.47	296.95	297.	
41.05	37.37		119.153	5.99	296.65	300.27	300.32	296.95	300.	
68.75	50.52		1109.082	5.98	296.85	297.38	297.55	297.66	297.	
68.75	50.52		114.128	6.06	296.99	302.09	302.26	297.66	302.	
68.75	50.52		840.041	5.99	297.12	297.81	297.99	297.66	298.	
68.75	50.52		100.686	6.07	297.26	303.05	303.22	297.66	303.	
114.30	94.11		1285.909	6.04	297.05	297.89	298.11	298.56	298.	
114.30	94.11		131.804	6.16	297.30	305.54	305.76	298.56	306.	
114.30	94.11		1184.445	6.05	297.55	298.47	298.69	298.56	299.	
114.30	94.11		111.378	6.19	297.80	307.56	307.78	298.56	308.	
169.21	125.26		846.051	6.02	296.05	297.76	298.17	298.06	298.	
169.21	125.26		122.893	6.18	296.38	308.15	308.56	298.06	309.	
169.21	125.26		745.189	6.03	296.72	298.66	299.08	298.06	299.	
169.21	125.26		102.735	6.22	297.05	311.13	311.54	298.06	312.	
223.85	168.85		1393.243	6.10	296.85	298.25	298.78	299.56	299.	
223.85	168.85		127.866	6.32	297.30	312.54	313.07	299.56	314.	
223.85	168.85		1280.433	6.12	297.75	299.28	299.80	299.56	300.	
223.85	168.85		101.004	6.40	298.20	317.50	318.03	299.56	319.	
297.36	218.00		1248.578	6.13	296.45	298.46	299.21	299.95	300.	
297.36	218.00		128.570	6.41	297.03	316.60	317.35	299.95	318.	
297.36	218.00		1130.290	6.15	297.62	299.84	300.59	299.95	302.	
297.36	218.00		300.096	6.52	314.80	323.18	323.93	299.95	325.	
380.32	267.82		1527.209	6.23	297.25	299.27	300.30	301.56	302.	
380.32	267.82		477.208	6.58	314.80	321.28	322.30	301.56	324.	
380.32	267.82		1688.019	6.25	298.68	300.51	301.54	301.56	303.	
380.32	267.82		196.687	6.73	314.80	330.52	331.54	301.56	333.	
491.72	355.02		1530.377	6.27	296.45	299.13	300.39	302.26	302.	
491.72	355.02		373.383	6.70	314.80	325.77	327.04	302.26	329.	
491.72	355.02		1564.510	6.30	298.35	300.97	302.23	302.26	304.	
491.72	355.02		180.981	6.89	314.80	337.44	338.71	302.26	340.	
596.77	417.31		1516.246	6.29	295.75	298.93	300.55	302.55	303.	
596.77	417.31		339.381	6.78	314.80	328.99	330.62	302.55	333.	
596.77	417.31		1449.550	6.33	297.98	301.30	302.93	302.55	305.	
596.77	417.31		170.888	7.01	314.80	342.98	344.61	302.55	347.	
723.04	504.44		2242.255	6.42	296.66	299.26	301.23	304.76	304.	
723.04	504.44		299.851	6.99	314.80	334.22	336.19	304.76	339.	
723.04	504.44		2292.123	6.46	299.36	301.90	303.87	304.76	307.	
723.04	504.44		165.161	7.26	314.80	350.05	352.02	304.76	355.	
761.88	379.94		10606.280	6.27	296.25	296.66	299.73	302.35	302.	
761.88	379.94		417.081	6.73	314.80	325.31	328.38	302.35	330.	
761.88	379.94		-1619.240	6.25	298.28	295.57	298.64	302.35	301.	
761.88	379.94		166.677	6.99	314.80	341.11	344.17	302.35	346.	

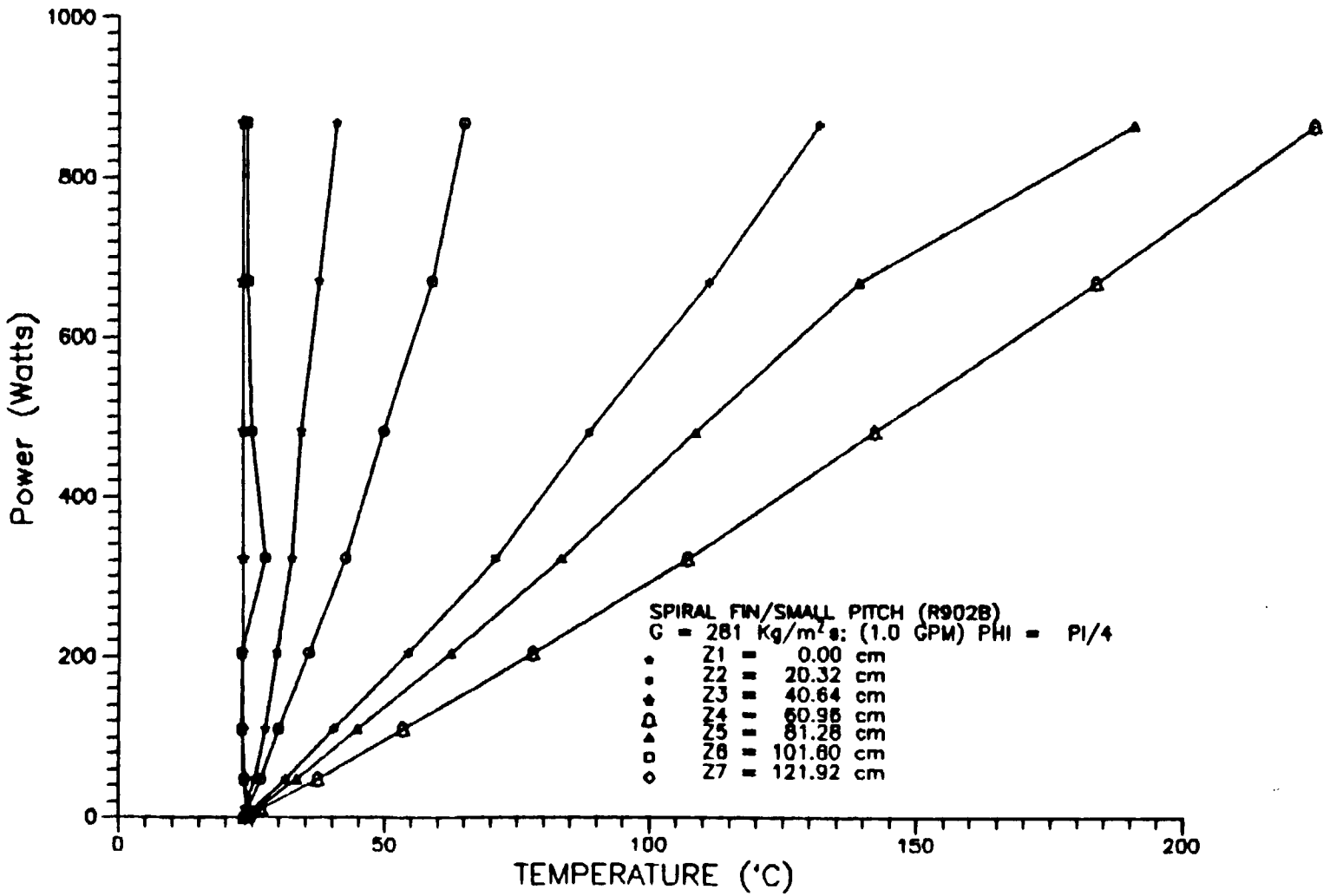
CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH; H826XX

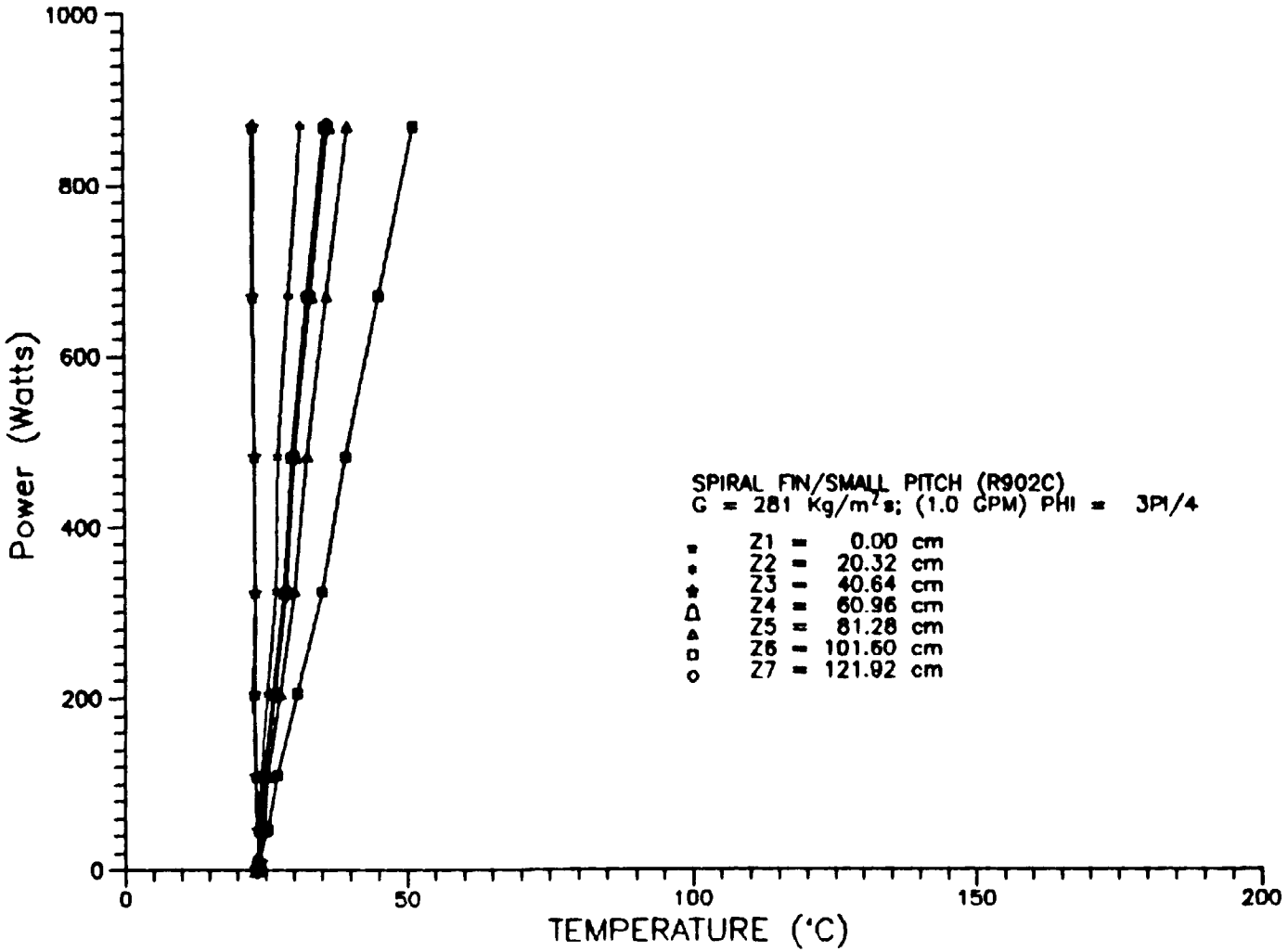
R826XX.TER

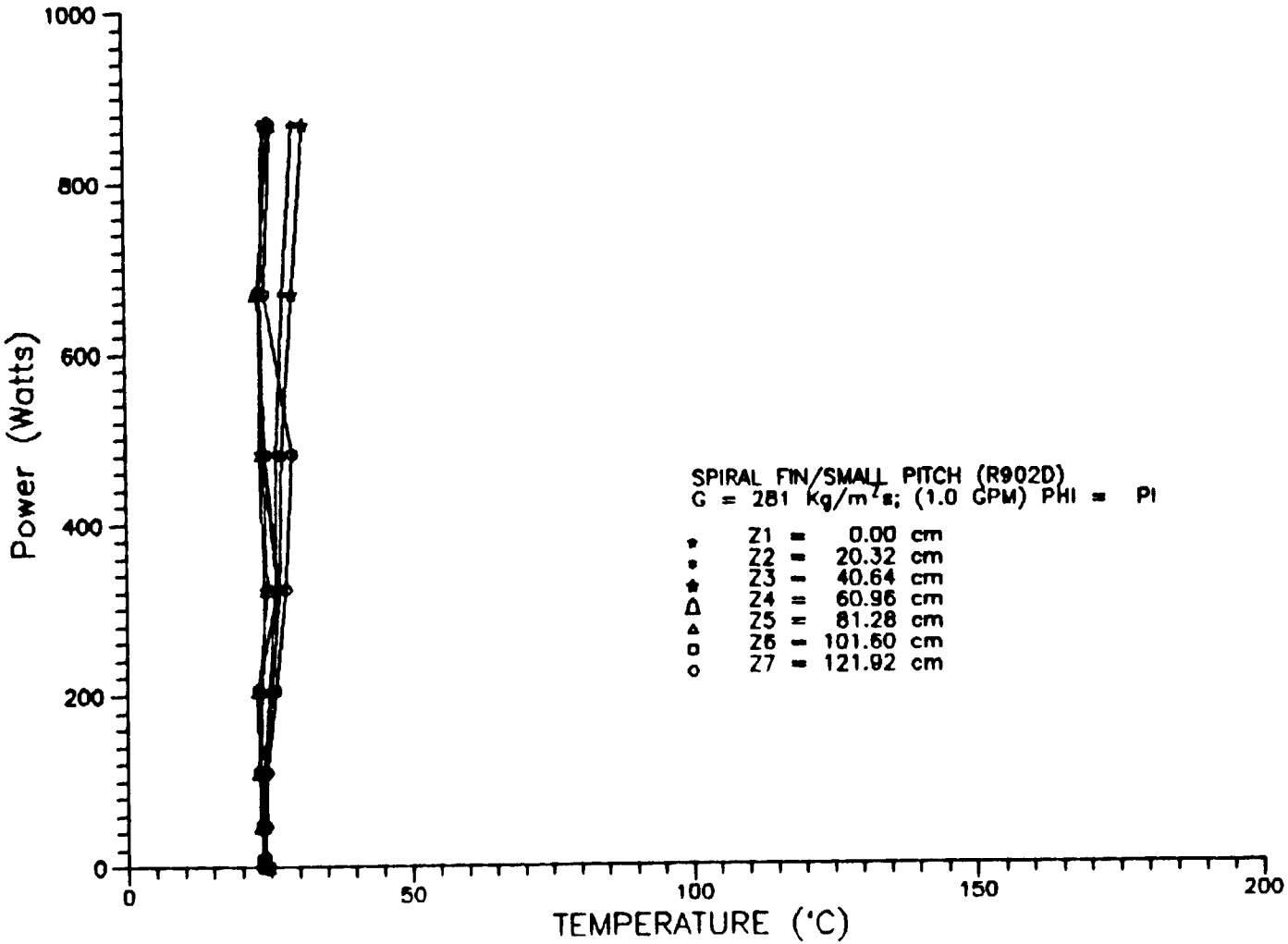
A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	6.23		94.654	5.92	296.42	297.18	297.14	296.45	297.	
.00	6.23		34.942	5.94	296.43	298.49	298.45	296.45	298.	
.00	6.23		294360.700	5.91	296.45	296.45	296.41	296.45	296.	
17.39	19.93		173.714	5.92	296.16	297.49	297.48	296.29	297.	
17.39	19.93		293.636	5.91	296.22	297.00	297.00	296.29	297.	
17.39	19.93		904.662	5.90	296.27	296.52	296.52	296.29	296.	
41.05	37.37		179.329	5.98	296.75	299.15	299.21	296.95	299.	
41.05	37.37		1425.190	5.95	296.85	297.15	297.21	296.95	297.	
41.05	37.37		779.449	5.95	296.95	297.50	297.56	296.95	297.	
68.75	50.52		159.656	6.04	297.39	301.04	301.21	297.66	301.	
68.75	50.52		-3341.211	5.98	297.53	297.35	297.52	297.66	297.	
68.75	50.52		644.461	6.00	297.66	298.57	298.74	297.66	299.	
114.30	94.11		156.360	6.15	298.06	305.00	305.22	298.56	305.	
114.30	94.11		768.563	6.07	298.31	299.72	299.94	298.56	300.	
114.30	94.11		812.570	6.07	298.56	299.90	300.12	298.56	300.	
169.21	125.26		162.789	6.15	297.39	306.27	306.69	298.06	307.	
169.21	125.26		3428.043	6.03	297.73	298.15	298.56	298.06	299.	
169.21	125.26		683.699	6.06	298.06	300.17	300.59	298.06	301.	
223.85	168.85		167.893	6.29	298.66	310.26	310.79	299.56	311.	
223.85	168.85		5704.019	6.12	299.11	299.45	299.98	299.56	301.	
223.85	168.85		707.144	6.16	299.56	302.32	302.85	299.56	303.	
297.36	218.00		168.269	6.37	298.78	313.73	314.48	299.95	315.	
297.36	218.00		2644.208	6.16	299.37	300.32	301.06	299.95	302.	
297.36	218.00		689.716	6.21	299.95	303.60	304.34	299.95	305.	
380.32	267.82		171.644	6.52	300.12	318.12	319.15	301.56	320.	
380.32	267.82		5308.412	6.26	300.83	301.41	302.44	301.56	304.	
380.32	267.82		676.041	6.33	301.55	306.12	307.14	301.56	308.	
491.72	355.02		589.006	6.63	314.80	321.76	323.02	302.26	325.	
491.72	355.02		-38692.080	6.30	301.20	301.09	302.36	302.26	304.	
491.72	355.02		709.069	6.41	302.15	307.93	309.19	302.26	311.	
596.77	417.31		3968.302	6.33	300.22	301.43	303.05	302.55	305.	
596.77	417.31		482.312	6.71	314.80	324.79	326.41	302.55	329.	
596.77	417.31		-1568.835	6.30	302.45	299.38	301.00	302.55	303.	
723.04	504.44		365.619	6.93	314.80	330.72	332.70	304.76	335.	
723.04	504.44		-1552.285	6.42	303.41	299.66	301.63	304.76	304.	
723.04	504.44		731.798	6.63	304.76	312.71	314.69	304.76	317.	
761.88	379.94		409.322	6.73	314.80	325.51	328.58	302.35	331.	
761.88	379.94		-2920.331	6.32	301.33	299.83	302.90	302.35	305.	
761.88	379.94		705.111	6.45	302.35	308.57	311.63	302.35	314.	

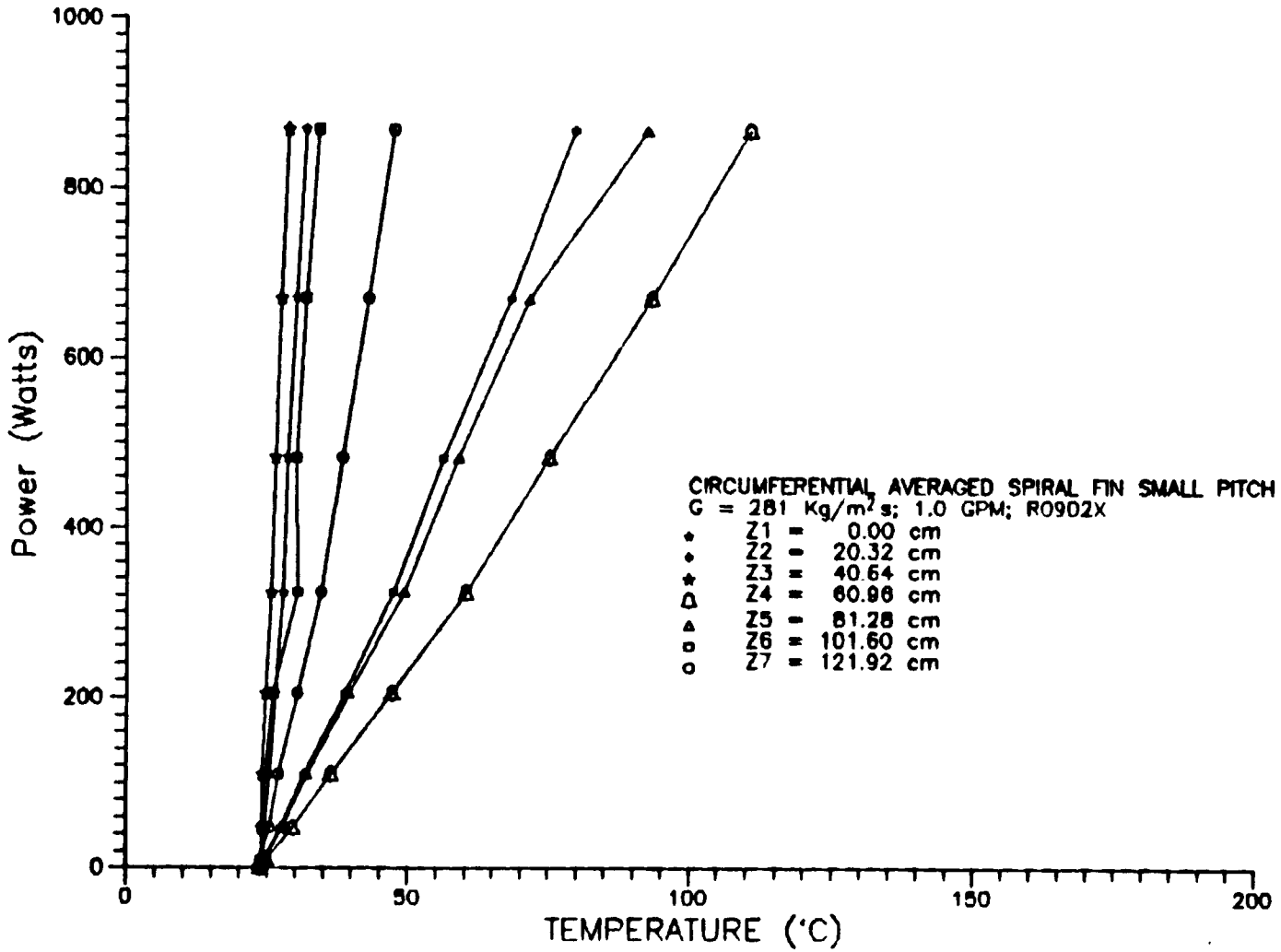

50
40
30
20
10
0
TEMPERATURE (°C)
0
200
400
600
800
1000
POWER (WATTS)
SPIRAL FIN SMALL PITCH; R0902
G = 281 Kg/m²s; (1 GPM) INLET TEMP. = 23.5 C
▲ - INLET TEMPERATURE
● - EXIT TEMPERATURE

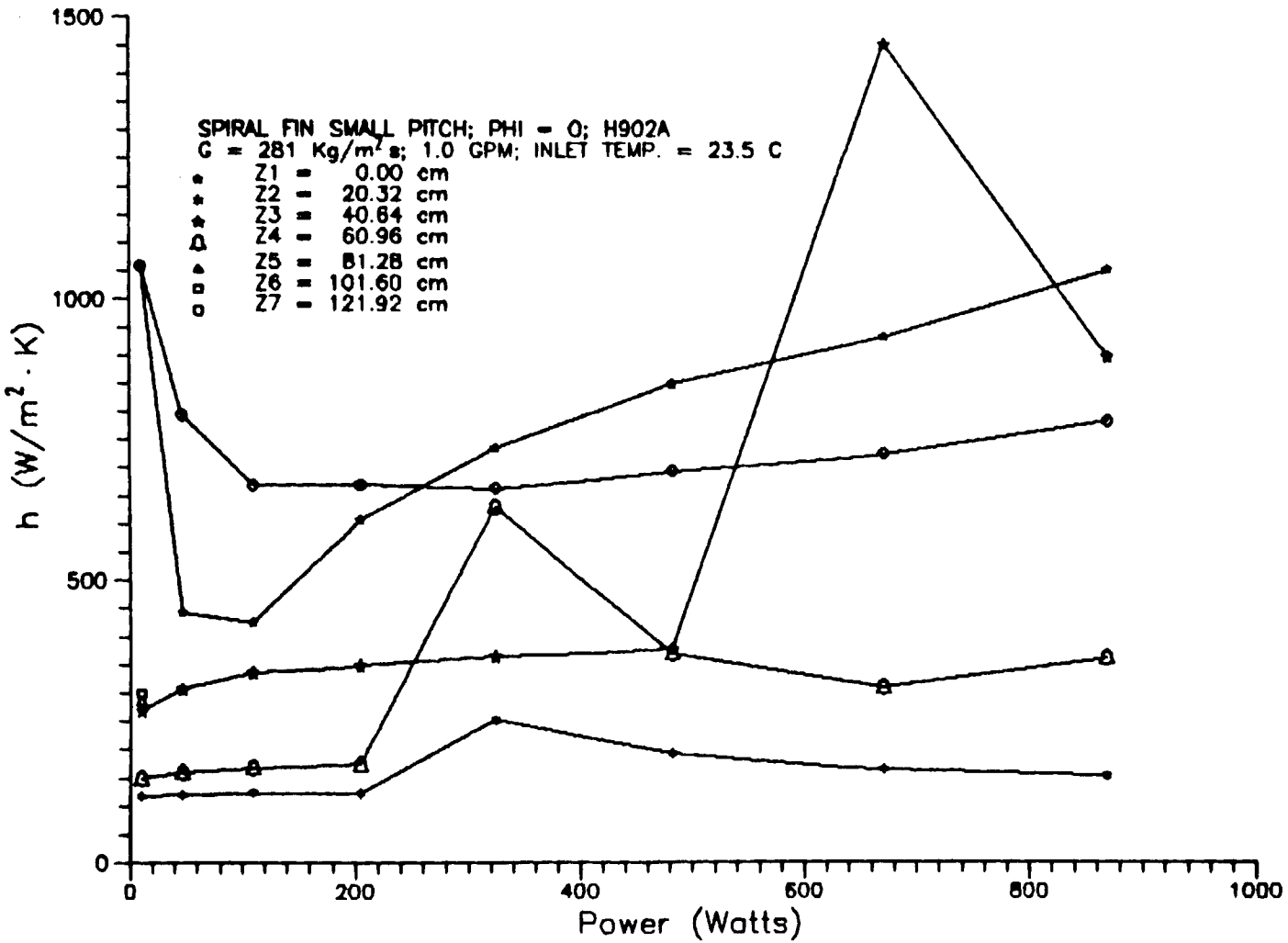

Power (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)
SPIRAL FIN/SMALL PITCH (R902A)
G = 281 kg/m²s; (1.0 GPM) PHI = 0
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

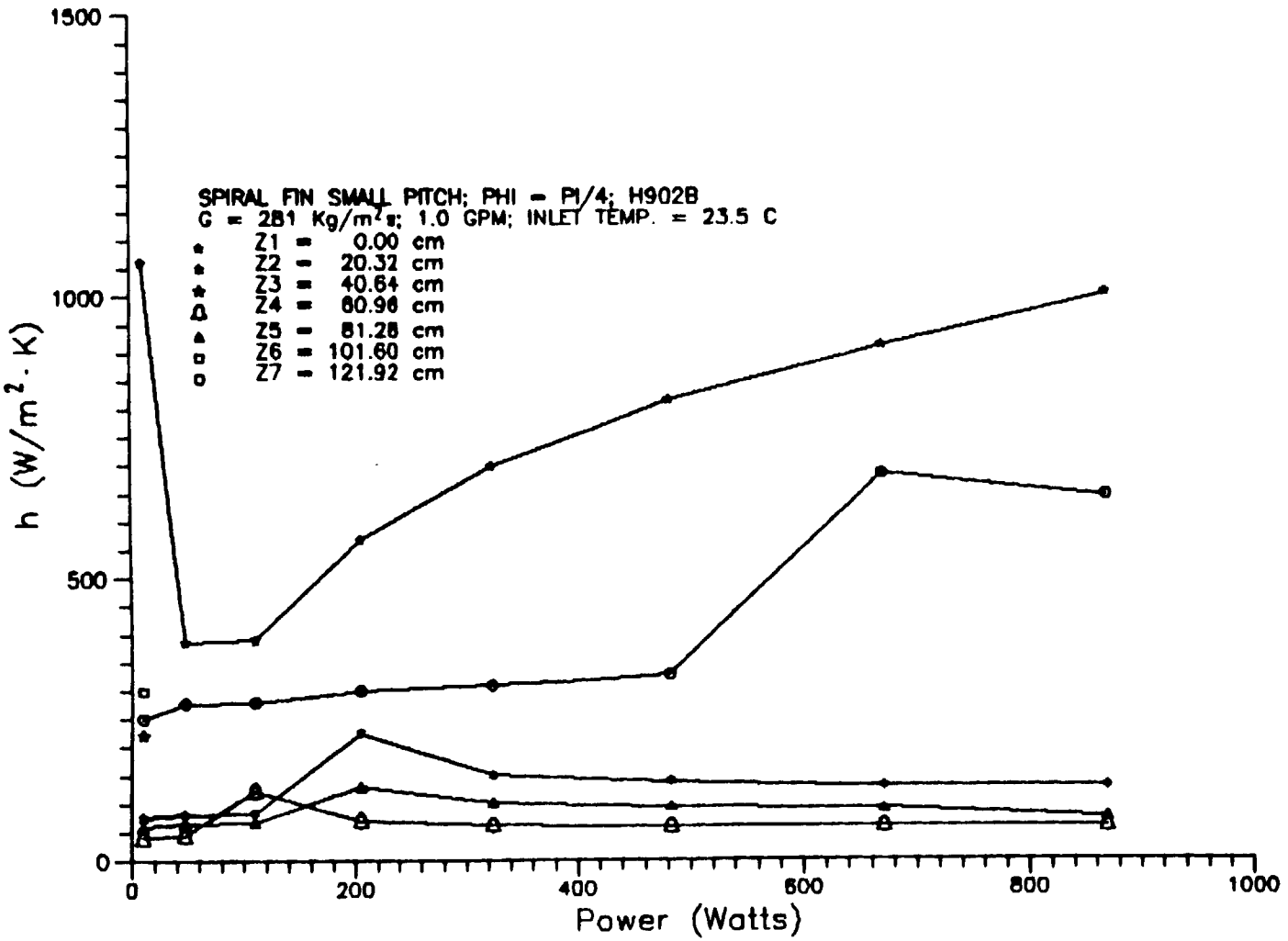

Power (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)
SPIRAL FIN/SMALL PITCH (R902B)
G = 281 Kg/m²s: (1.0 GPM) PHI = PI/4
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

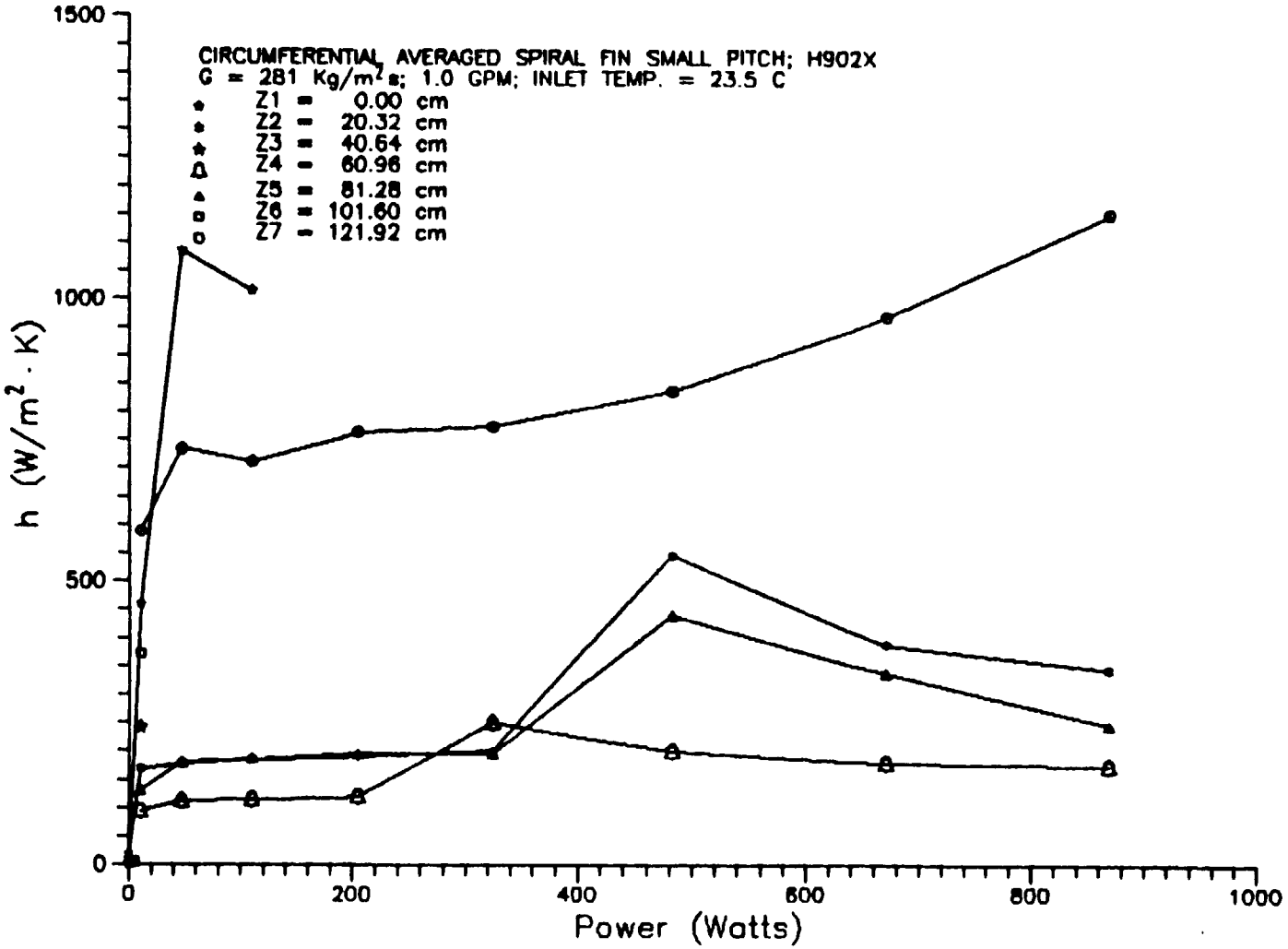

1000
800
600
400
200
0
Power (Watts)
0
50
100
150
200
TEMPERATURE (°C)
SPIRAL FIN/SMALL PITCH (R902C)
G = 281 Kg/m²s; (1.0 GPM) PHI = 3PI/4
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

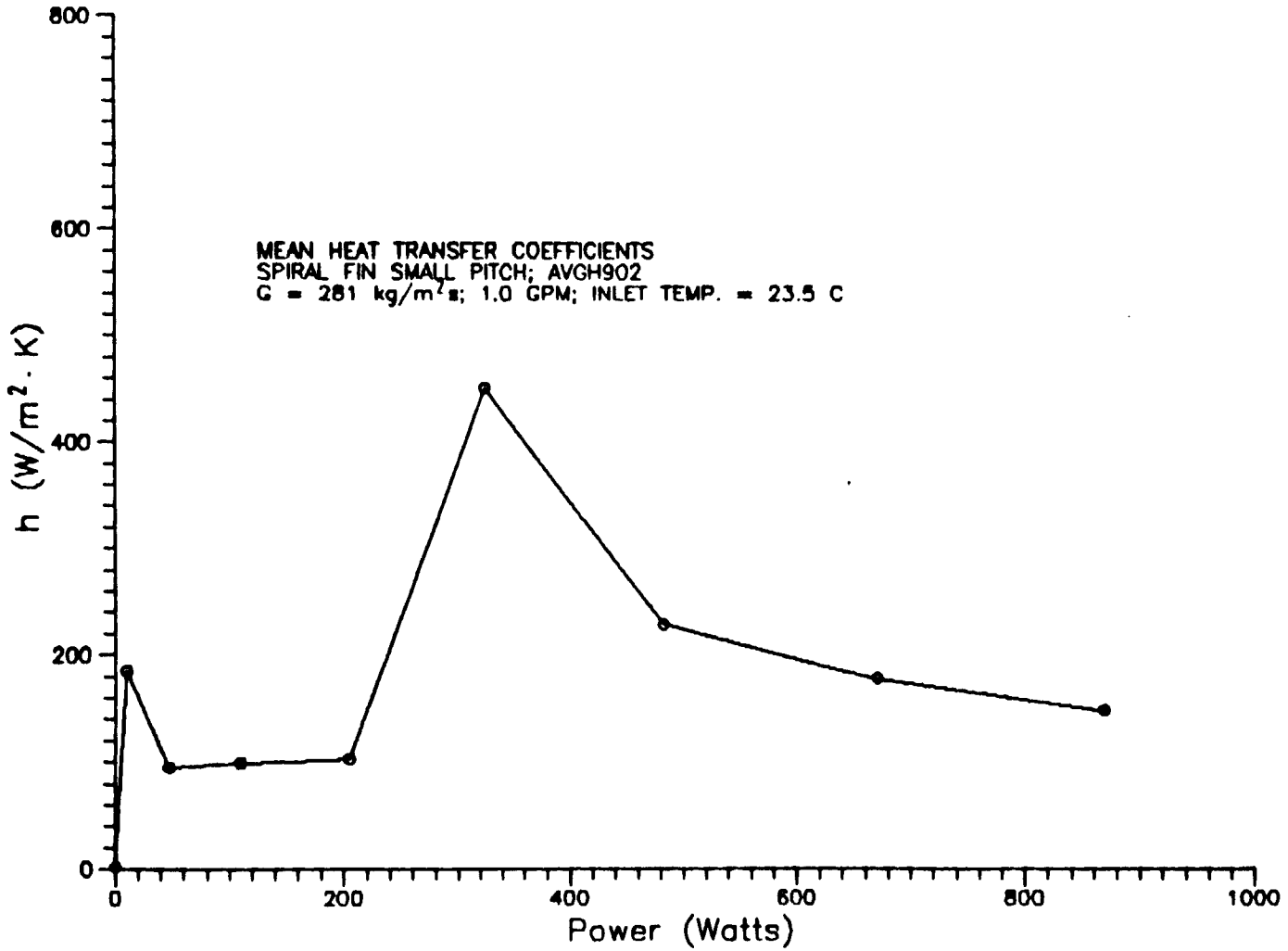

1000
800
600
400
200
0
Power (Watts)
0
50
100
150
200
TEMPERATURE (°C)
SPIRAL FIN/SMALL PITCH (R902D)
G = 281 Kg/m²s; (1.0 GPM) PHI = PI
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm


Power (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)
CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH
G = 281 Kg/m² s; 1.0 GPM; R09D2X
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm


SPIRAL FIN SMALL PITCH; PHI = 0; H902A
G = 281 Kg/m² s; 1.0 GPM; INLET TEMP. = 23.5 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m² · K)
Power (Watts)
0
500
1000
1500
0
200
400
600
800
1000


SPIRAL FIN SMALL PITCH; PHI = PI/4; H902B
G = 281 Kg/m²s; 1.0 GPM; INLET TEMP. = 23.5 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m².K)
1500
1000
500
0
0
200
400
600
800
1000
Power (Watts)


CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH; H902X
G = 281 Kg/m²s; 1.0 GPM; INLET TEMP. = 23.5 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m² · K)
1500
1000
500
0
0
200
400
600
800
1000
Power (Watts)


MEAN HEAT TRANSFER COEFFICIENTS
SPIRAL FIN SMALL PITCH; AVGH902
G = 281 kg/m²s; 1.0 GPM; INLET TEMP. = 23.5 C
h (W/m². K)
800
600
400
200
0
0
200
400
600
800
1000
Power (Watts)

H902A.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-1775.884	5.468	1.364	1.515
10.19	1061.541	117.691	268.048	149.581
47.07	443.976	119.922	306.950	158.798
109.83	425.904	123.548	336.670	167.894
204.77	608.416	122.571	349.667	173.629
324.07	735.734	252.273	364.844	630.883
482.69	849.225	193.182	378.701	370.127
671.03	933.339	164.251	1453.338	311.326
868.95	1053.252	153.163	898.540	362.192

H902AA.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-1.872	-1.865	-6.791
10.19	287.508	298.338	1058.387
47.07	-721.740	-645.180	794.309
109.83	-967.794	-868.987	668.676
204.77	-811.979	-740.021	669.197
324.07	-11966.150	-5974.292	663.434
482.69	-1269.162	-1120.738	694.376
671.03	-1054.737	-968.262	725.911
868.95	-1002.841	-886.597	783.506

H902B.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-1775.884	5.468	-.973	-.649
10.19	1061.541	75.560	222.364	40.944
47.07	386.697	81.202	-1121.052	44.447
109.83	390.251	84.800	-1374.424	122.716
204.77	568.711	225.470	-1048.207	72.055
324.07	698.521	150.531	-1031.441	63.127
482.69	815.597	139.671	-1295.879	61.273
671.03	913.496	130.531	-1229.717	60.422
868.95	1005.682	130.388	-1225.989	60.677

H902BB.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-.093	-1.922	-2016.407
10.19	59.278	298.338	250.548
47.07	65.282	-583.417	277.809
109.83	67.876	-818.868	279.859
204.77	130.804	-740.021	299.472
324.07	102.461	-3480.264	309.481
482.69	94.934	-1141.271	329.362
671.03	90.307	-957.565	685.028
868.95	75.674	-893.656	646.678

H902X.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	2.671	17.190	-.817	-.524
10.19	459.509	167.462	243.105	95.217
47.07	1083.449	178.135	-3951.796	111.492
109.83	1014.606	186.574	-6146.125	116.053
204.77	1964.797	191.787	-2690.235	121.228
324.07	2977.304	200.062	-2472.380	249.756
482.69	3014.174	546.471	-3737.812	201.577
671.03	3958.286	389.858	-3266.716	181.038
868.95	4953.261	345.686	-3131.780	174.680

H902XX.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-1.114	-1.702	-36.540
10.19	131.053	372.053	587.425
47.07	179.973	-2081.238	734.151
109.83	186.079	-7873.420	711.051
204.77	194.701	-3737.228	764.523
324.07	194.527	2517.229	773.462
482.69	440.608	-73466.440	836.986
671.03	338.525	-7170.673	970.269
868.95	246.858	-5071.122	1152.155

SPIRAL FIN SMALL PITCH; G = 281 kg/m s; PHI = 0

_R902A.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	8.31		-241600.400	5.92	296.45	296.45	296.40	296.75	296.
.00	8.31		1153.436	5.92	296.47	296.55	296.50	296.75	296.
.00	8.31		575.450	5.93	296.48	296.65	296.60	296.75	296.
.00	8.31		639.285	5.93	296.50	296.65	296.60	296.75	296.
10.19	8.31		765.677	5.95	296.55	296.68	296.70	297.35	296.
10.19	8.31		86.367	5.97	296.57	297.68	297.70	297.35	297.
10.19	8.31		194.670	5.96	296.58	297.08	297.10	297.35	297.
10.19	8.31		109.390	5.97	296.60	297.48	297.50	297.35	297.
47.07	49.83		422.850	5.96	296.75	298.11	298.13	296.85	298.
47.07	49.83		115.830	6.01	296.85	301.81	301.83	296.85	302.
47.07	49.83		293.231	5.97	296.95	298.91	298.93	296.85	299.
47.07	49.83		152.796	6.00	297.05	300.81	300.83	296.85	301.
109.83	83.05		289.832	5.97	296.25	299.56	299.82	296.45	300.
109.83	83.05		85.190	6.09	296.42	307.67	307.93	296.45	308.
109.83	83.05		229.550	5.99	296.58	300.76	301.02	296.45	301.
109.83	83.05		115.276	6.05	296.75	305.06	305.32	296.45	305.
204.77	157.79		421.540	5.99	296.65	300.97	301.43	296.25	302.
204.77	157.79		86.201	6.25	296.97	318.09	318.55	296.25	319.
204.77	157.79		243.066	6.05	297.28	304.77	305.24	296.25	306.
204.77	157.79		121.520	6.17	297.60	312.58	313.05	296.25	314.
324.07	224.22		457.486	6.04	297.25	302.91	303.80	296.35	305.
324.07	224.22		159.320	6.48	314.80	331.04	331.94	296.35	333.
324.07	224.22		227.686	6.14	298.15	309.51	310.41	296.35	311.
324.07	224.22		396.282	6.32	314.80	321.33	322.23	296.35	323.
482.69	373.71		590.324	6.06	296.25	303.56	304.63	296.35	307.
482.69	373.71		136.438	6.75	314.80	346.41	347.49	296.35	349.
482.69	373.71		264.267	6.23	297.75	314.07	315.15	296.35	317.
482.69	373.71		259.945	6.50	314.80	331.39	332.47	296.35	334.
671.03	514.89		642.942	6.10	296.35	305.59	307.12	295.95	310.
671.03	514.89		115.003	7.10	314.80	366.47	368.00	295.95	371.
671.03	514.89		1005.160	6.33	314.80	320.71	322.24	295.95	325.
671.03	514.89		216.560	6.68	314.80	342.24	343.77	295.95	347.
868.95	680.98		740.861	6.14	296.55	307.16	309.05	295.75	313.
868.95	680.98		109.520	7.47	314.80	386.56	388.45	295.75	392.
868.95	680.98		634.630	6.45	314.80	327.18	329.07	295.75	333.
868.95	680.98		256.775	6.75	314.80	345.41	347.30	295.75	351.

SPIRAL FIN SMALL PITCH; G = 281 kg/m s: PHI = 0

R902AA.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	8.31		71.810	5.94	296.52	297.85	297.80	296.75	297.	
.00	8.31		78.695	5.94	296.53	297.75	297.70	296.75	297.	
.00	8.31		-954.942	5.92	296.55	296.45	296.40	296.75	296.	
10.19	8.31		208.802	5.96	296.62	297.08	297.10	297.35	297.	
10.19	8.31		216.667	5.96	296.63	297.08	297.10	297.35	297.	
10.19	8.31		764.745	5.96	296.65	296.78	296.80	297.35	296.	
47.07	49.83		-682.774	5.93	297.15	296.31	296.33	296.85	296.	
47.07	49.83		-610.348	5.93	297.25	296.31	296.33	296.85	296.	
47.07	49.83		756.509	5.96	297.35	298.11	298.13	296.85	298.	
109.83	83.05		-654.267	5.91	296.92	295.45	295.71	296.45	296.	
109.83	83.05		-587.470	5.91	297.08	295.45	295.71	296.45	296.	
109.83	83.05		454.891	5.96	297.25	299.36	299.62	296.45	300.	
204.77	157.79		-559.529	5.90	297.92	294.66	295.12	296.25	296.	
204.77	157.79		-509.943	5.90	298.23	294.66	295.12	296.25	296.	
204.77	157.79		464.254	6.01	298.55	302.47	302.93	296.25	303.	
324.07	224.22		-7423.919	5.97	299.05	298.70	299.60	296.35	301.	
324.07	224.22		-3706.605	5.97	299.50	298.80	299.70	296.35	301.	
324.07	224.22		413.276	6.09	299.95	306.21	307.11	296.35	308.	
482.69	373.71		-879.275	5.93	299.25	294.34	295.42	296.35	297.	
482.69	373.71		-776.474	5.93	300.00	294.44	295.52	296.35	297.	
482.69	373.71		483.767	6.16	300.75	309.66	310.74	296.35	313.	
671.03	514.89		-724.029	5.90	300.48	292.28	293.81	295.95	297.	
671.03	514.89		-664.719	5.90	301.52	292.58	294.11	295.95	297.	
671.03	514.89		501.218	6.24	302.55	314.40	315.93	295.95	319.	
868.95	680.98		-703.069	5.89	302.02	290.84	292.73	295.75	297.	
868.95	680.98		-621.561	5.89	303.38	290.74	292.63	295.75	297.	
868.95	680.98		552.451	6.32	304.75	318.97	320.86	295.75	325.	

SPIRAL FIN SMALL PITCH; G = 281 kg/m s; PHI = PI/4

R902B.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	8.31		-241600.400	5.92	296.45	296.45	296.40	296.75	296.
.00	8.31		1153.436	5.92	296.47	296.55	296.50	296.75	296.
.00	8.31		205.281	5.93	296.48	296.95	296.90	296.75	296.
.00	8.31		273.709	5.93	296.50	296.85	296.80	296.75	296.
10.19	8.31		765.677	5.95	296.55	296.68	296.70	297.35	296.
10.19	8.31		56.034	5.98	296.57	298.28	298.30	297.35	298.
10.19	8.31		161.772	5.96	296.58	297.18	297.20	297.35	297.
10.19	8.31		31.129	6.00	296.60	299.68	299.70	297.35	299.
47.07	49.83		368.577	5.96	296.75	298.31	298.33	296.85	298.
47.07	49.83		79.127	6.05	296.85	304.12	304.14	296.85	304.
47.07	49.83		-1060.910	5.93	296.95	296.41	296.43	296.85	296.
47.07	49.83		44.320	6.14	297.05	310.03	310.04	296.85	310.
109.83	83.05		265.697	5.97	296.25	299.86	300.12	296.45	300.
109.83	83.05		58.955	6.17	296.42	312.67	312.93	296.45	313.
109.83	83.05		-929.313	5.91	296.58	295.55	295.81	296.45	296.
109.83	83.05		87.206	6.37	314.80	325.79	326.05	296.45	326.
204.77	157.79		394.134	5.99	296.65	301.27	301.73	296.25	302.
204.77	157.79		159.707	6.38	314.80	326.20	326.66	296.25	327.
204.77	157.79		-722.380	5.90	297.28	294.76	295.22	296.25	296.
204.77	157.79		52.130	6.77	314.80	349.73	350.20	296.25	351.
324.07	224.22		434.419	6.04	297.25	303.21	304.10	296.35	305.
324.07	224.22		95.643	6.66	314.80	341.86	342.75	296.35	344.
324.07	224.22		-638.293	5.90	298.15	294.10	294.99	296.35	296.
324.07	224.22		40.944	7.28	314.80	378.00	378.90	296.35	380.
482.69	373.71		567.012	6.07	296.25	303.86	304.94	296.35	307.
482.69	373.71		99.088	6.95	314.80	358.33	359.41	296.35	361.
482.69	373.71		-897.324	5.90	297.75	292.94	294.02	296.35	296.
482.69	373.71		44.374	7.93	314.80	412.00	413.08	296.35	415.
671.03	514.89		629.307	6.10	296.35	305.79	307.32	295.95	310.
671.03	514.89		91.720	7.33	314.80	379.59	381.12	295.95	384.
671.03	514.89		-843.945	5.88	298.42	291.37	292.90	295.95	296.
671.03	514.89		43.317	8.74	314.80	451.98	453.51	295.95	456.
868.95	680.98		707.473	6.14	296.55	307.66	309.55	295.75	313.
868.95	680.98		93.477	7.70	314.80	398.88	400.77	295.75	405.
868.95	680.98		-859.390	5.88	299.28	290.14	292.03	295.75	296.
868.95	680.98		44.378	9.62	314.80	491.90	493.79	295.75	497.

SPIRAL FIN SMALL PITCH; G = 281 kg/m s; PHI = PI/4

R902BB.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	8.31		393.831	5.93	296.52	296.76	296.71	296.75	296.	
.00	8.31		67.585	5.94	296.53	297.95	297.90	296.75	297.	
.00	8.31		-448686.500	5.92	296.55	296.55	296.50	296.75	296.	
10.19	8.31		44.350	5.99	296.62	298.78	298.80	297.35	298.	
10.19	8.31		216.667	5.96	296.63	297.08	297.10	297.35	297.	
10.19	8.31		182.276	5.96	296.65	297.18	297.20	297.35	297.	
47.07	49.83		64.108	6.08	297.15	306.12	306.14	296.85	306.	
47.07	49.83		-551.716	5.93	297.25	296.21	296.23	296.85	296.	
47.07	49.83		265.995	5.98	297.35	299.51	299.53	296.85	299.	
109.83	83.05		47.535	6.24	296.92	317.08	317.34	296.45	317.	
109.83	83.05		-553.490	5.90	297.08	295.35	295.61	296.45	296.	
109.83	83.05		191.279	6.01	297.25	302.26	302.52	296.45	303.	
204.77	157.79		93.325	6.51	314.80	334.31	334.78	296.25	335.	
204.77	157.79		-509.943	5.90	298.23	294.66	295.12	296.25	296.	
204.77	157.79		208.627	6.09	298.55	307.28	307.74	296.25	308.	
324.07	224.22		65.559	6.86	314.80	354.27	355.17	296.35	356.	
324.07	224.22		-2158.648	5.97	299.50	298.30	299.20	296.35	300.	
324.07	224.22		193.540	6.20	299.95	313.32	314.22	296.35	315.	
482.69	373.71		67.865	7.31	314.80	378.35	379.43	296.35	381.	
482.69	373.71		-790.728	5.93	300.00	294.54	295.62	296.35	298.	
482.69	373.71		230.296	6.31	300.75	319.48	320.56	296.35	322.	
671.03	514.89		63.948	7.85	314.80	407.72	409.25	295.95	412.	
671.03	514.89		-657.359	5.90	301.52	292.48	294.01	295.95	297.	
671.03	514.89		474.614	6.44	314.80	327.32	328.85	295.95	332.	
868.95	680.98		54.939	8.88	314.80	457.85	459.74	295.75	463.	
868.95	680.98		-626.522	5.89	303.38	290.84	292.73	295.75	297.	
868.95	680.98		457.194	6.53	314.80	331.99	333.88	295.75	338.	

CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH; H902

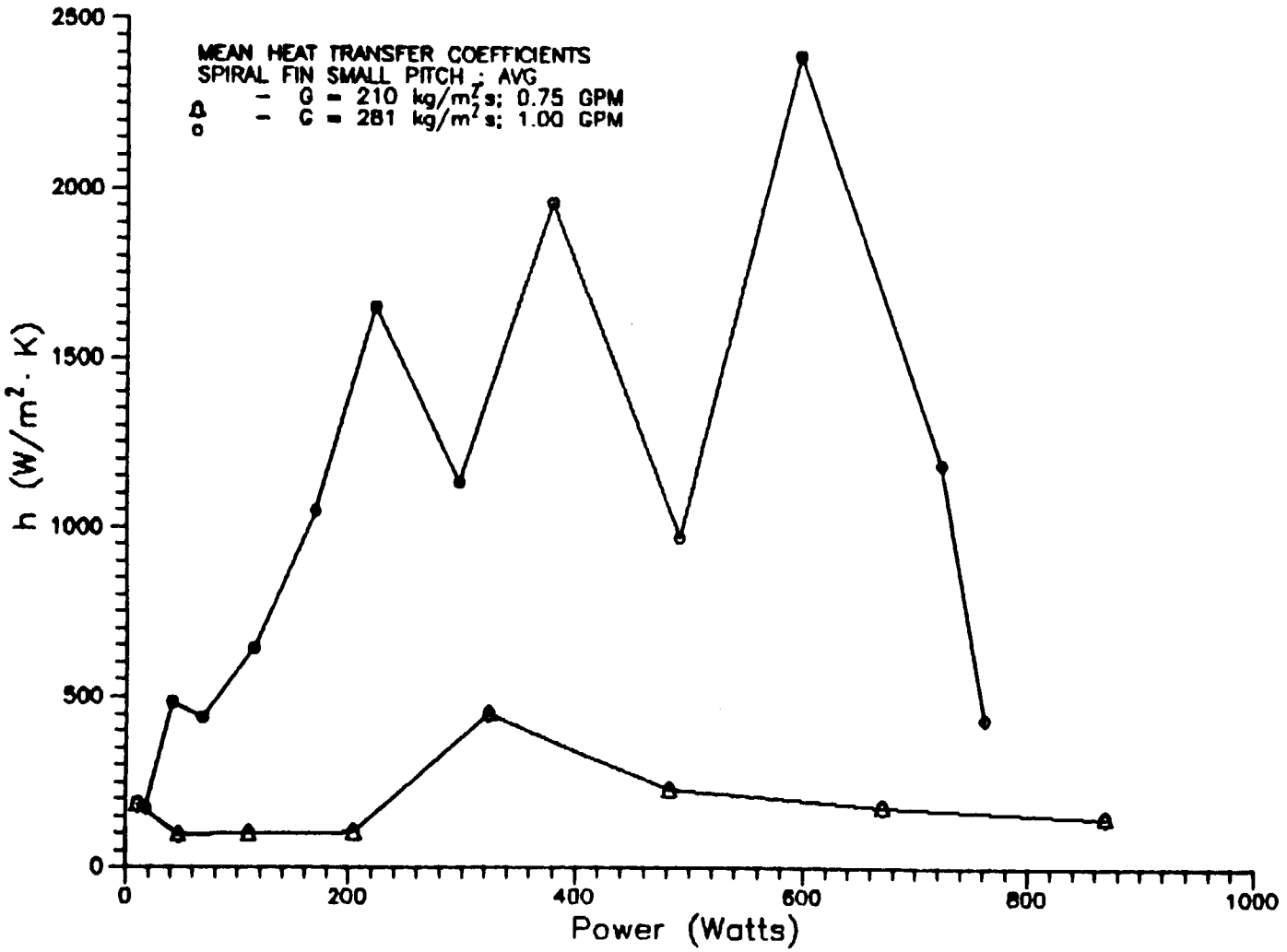
R902X.TER

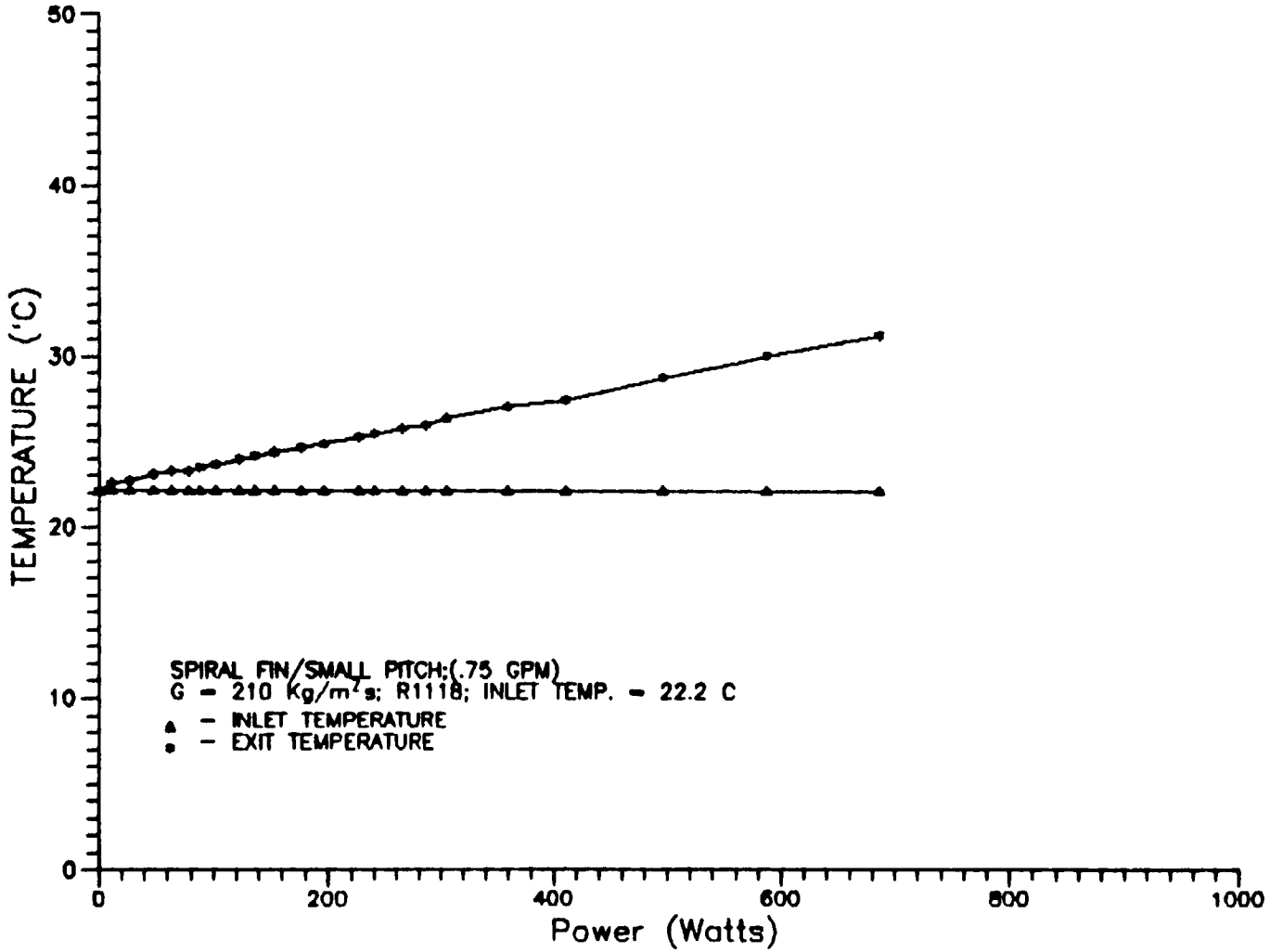
A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	8.31		695.638	5.92	296.45	296.59	296.53	296.75	296.	
.00	8.31		2900.097	5.92	296.47	296.50	296.45	296.75	296.	
.00	8.31		229.927	5.93	296.48	296.90	296.85	296.75	296.	
.00	8.31		294.801	5.93	296.50	296.83	296.77	296.75	296.	
10.19	8.31		332.360	5.96	296.55	296.84	296.86	297.35	296.	
10.19	8.31		122.201	5.96	296.57	297.35	297.37	297.35	297.	
10.19	8.31		176.708	5.96	296.58	297.13	297.15	297.35	297.	
10.19	8.31		70.226	5.97	296.60	297.96	297.98	297.35	298.	
47.07	49.83		1028.820	5.94	296.75	297.31	297.33	296.85	297.	
47.07	49.83		171.013	5.99	296.85	300.21	300.23	296.85	300.	
47.07	49.83		-3745.553	5.94	296.95	296.80	296.81	296.85	297.	
47.07	49.83		107.920	6.02	297.05	302.38	302.40	296.85	302.	
109.83	83.05		688.324	5.94	296.25	297.64	297.90	296.45	298.	
109.83	83.05		127.862	6.03	296.42	303.91	304.17	296.45	304.	
109.83	83.05		-4160.856	5.92	296.58	296.35	296.61	296.45	297.	
109.83	83.05		80.158	6.11	296.75	308.71	308.96	296.45	309.	
204.77	157.79		1357.805	5.95	296.65	297.99	298.45	296.25	299.	
204.77	157.79		133.990	6.14	296.97	310.56	311.02	296.25	312.	
204.77	157.79		-1856.438	5.92	297.28	296.30	296.76	296.25	297.	
204.77	157.79		85.320	6.27	297.60	318.94	319.41	296.25	320.	
324.07	224.22		1847.045	5.97	297.25	298.65	299.55	296.35	301.	
324.07	224.22		125.458	6.28	297.70	318.33	319.22	296.35	320.	
324.07	224.22		-1531.969	5.94	298.15	296.46	297.36	296.35	298.	
324.07	224.22		157.744	6.48	314.80	331.20	332.10	296.35	333.	
482.69	373.71		2091.233	5.98	296.25	298.31	299.39	296.35	301.	
482.69	373.71		383.035	6.42	314.80	326.06	327.14	296.35	329.	
482.69	373.71		-2591.171	5.95	297.75	296.08	297.16	296.35	299.	
482.69	373.71		142.298	6.73	314.80	345.11	346.19	296.35	348.	
671.03	514.89		2721.647	5.99	296.35	298.53	300.06	295.95	303.	
671.03	514.89		270.789	6.59	314.80	336.74	338.27	295.95	341.	
671.03	514.89		-2244.505	5.95	298.42	295.77	297.30	295.95	300.	
671.03	514.89		126.594	7.02	314.80	361.74	363.27	295.95	366.	
868.95	680.98		3478.218	6.01	296.55	298.81	300.70	295.75	305.	
868.95	680.98		245.146	6.78	314.80	346.86	348.75	295.75	353.	
868.95	680.98		-2197.793	5.96	299.28	295.71	297.59	295.75	302.	
868.95	680.98		124.677	7.32	314.80	377.84	379.73	295.75	384.	

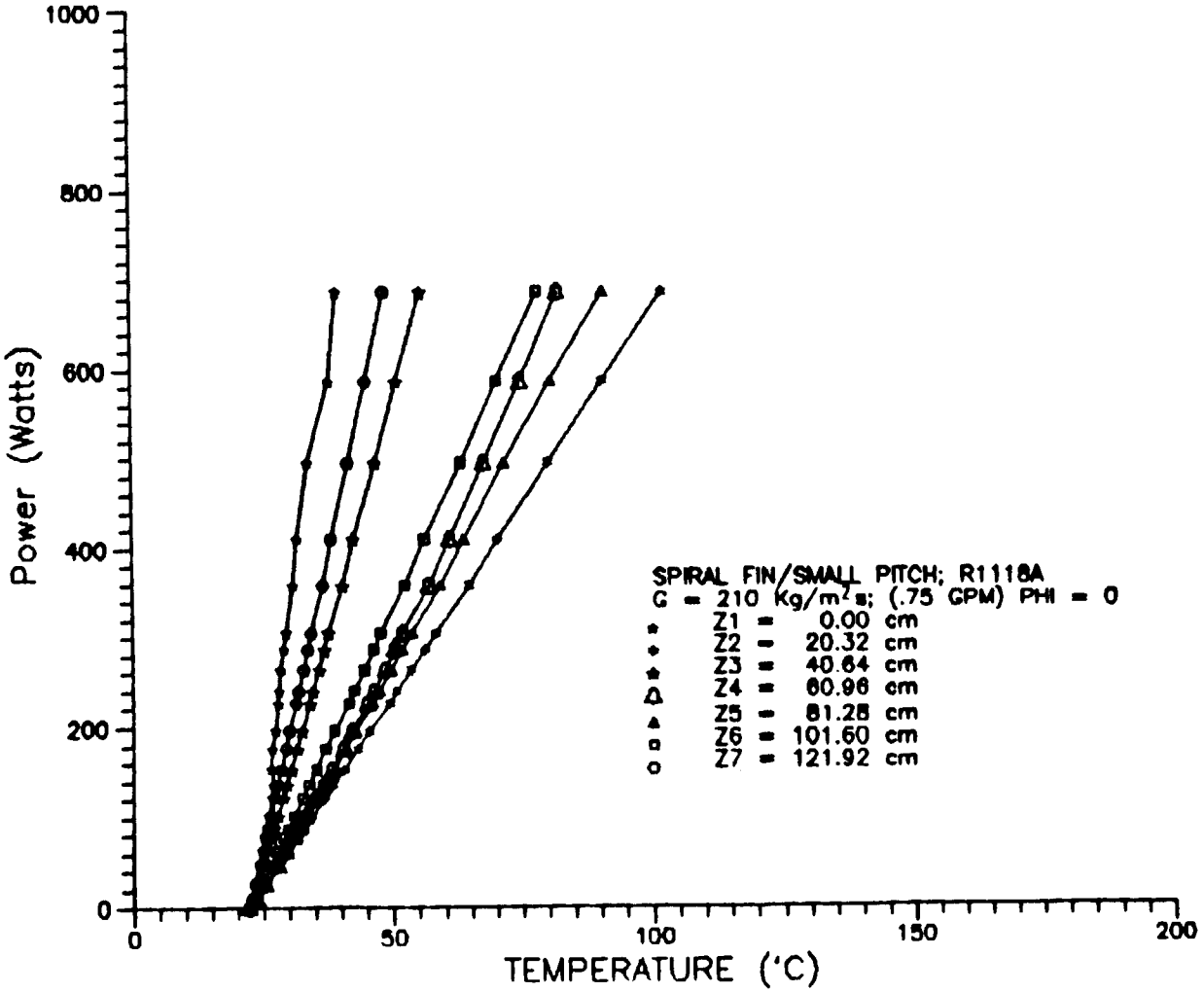
CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH; H902XX

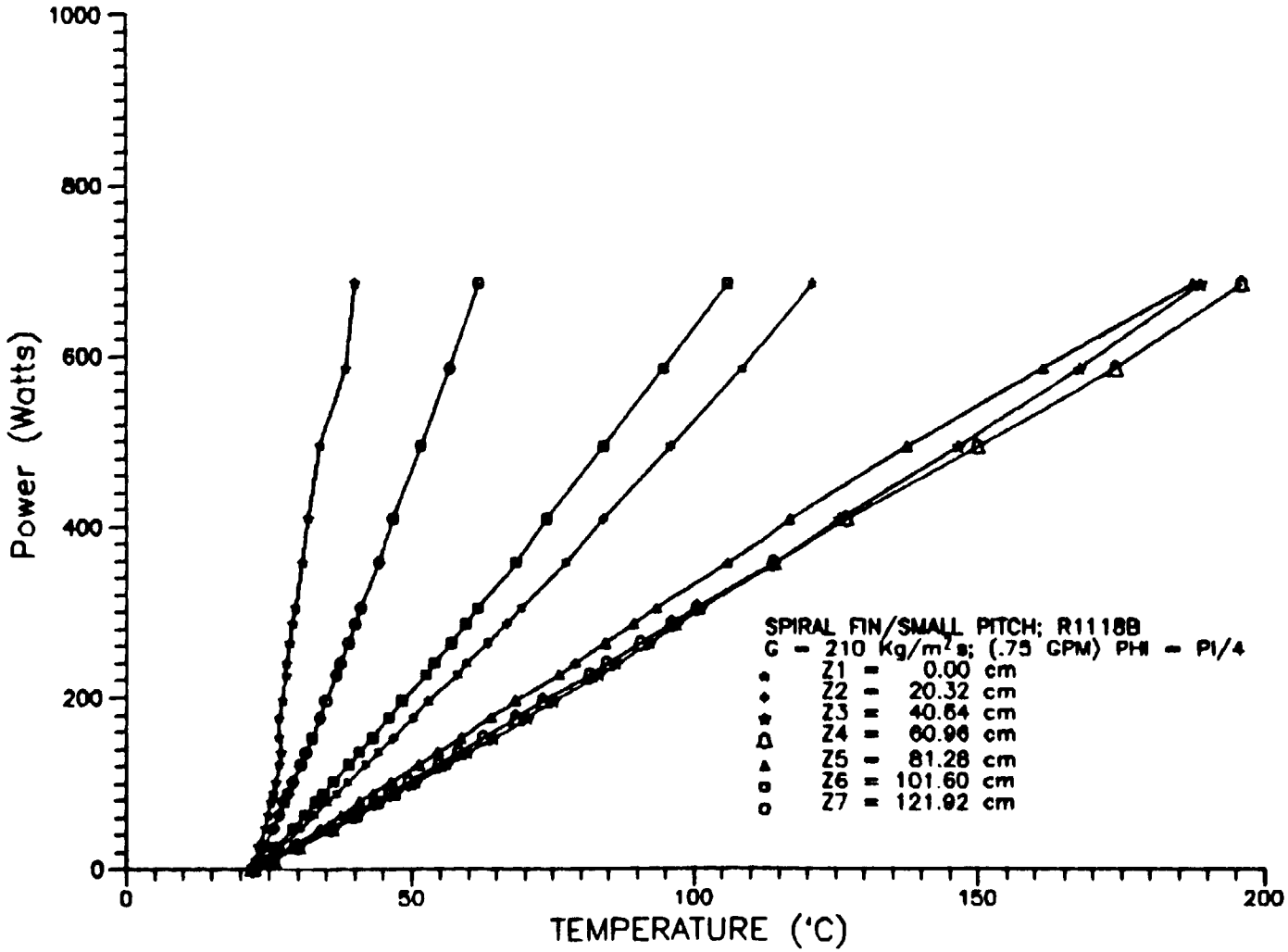
R902XX.TER

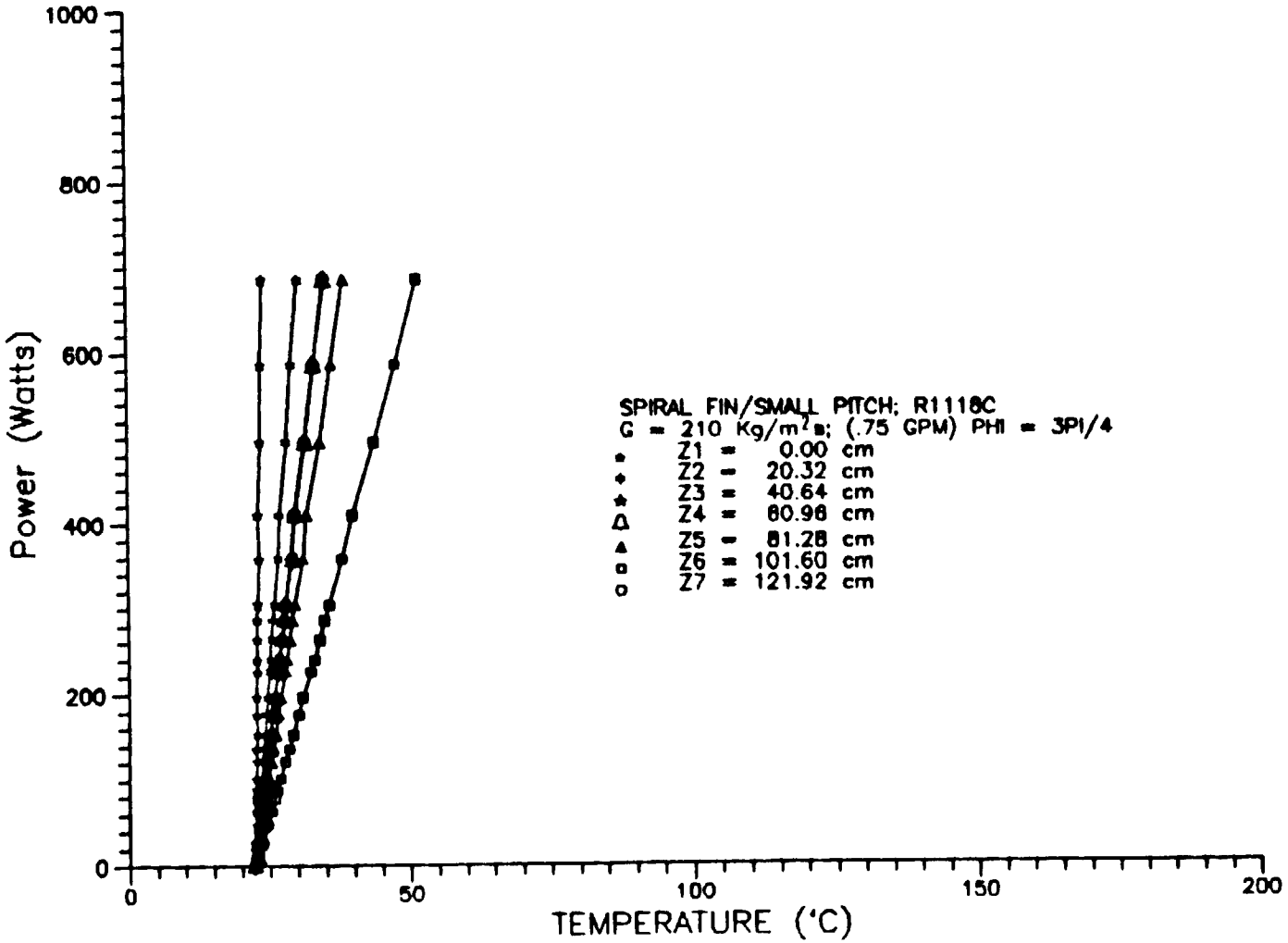
A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	8.31		208.983	5.93	296.52	296.98	296.92	296.75	296.
.00	8.31		110.487	5.94	296.53	297.40	297.35	296.75	297.
.00	8.31		-7236.879	5.92	296.55	296.54	296.48	296.75	296.
10.19	8.31		96.070	5.97	296.62	297.61	297.63	297.35	297.
10.19	8.31		269.805	5.96	296.63	296.99	297.01	297.35	297.
10.19	8.31		425.180	5.96	296.65	296.88	296.90	297.35	296.
47.07	49.83		172.949	5.99	297.15	300.48	300.49	296.85	300.
47.07	49.83		-1973.594	5.94	297.25	296.96	296.98	296.85	297.
47.07	49.83		699.398	5.96	297.35	298.17	298.19	296.85	298.
109.83	83.05		127.630	6.04	296.92	304.43	304.68	296.45	305.
109.83	83.05		-5334.830	5.93	297.08	296.90	297.16	296.45	297.
109.83	83.05		483.618	5.96	297.25	299.23	299.49	296.45	300.
204.77	157.79		136.114	6.15	297.92	311.30	311.76	296.25	312.
204.77	157.79		-2581.616	5.94	298.23	297.53	297.99	296.25	299.
204.77	157.79		530.163	6.01	298.55	301.98	302.45	296.25	303.
324.07	224.22		122.116	6.31	299.05	320.24	321.14	296.35	322.
324.07	224.22		1563.752	6.01	299.50	301.15	302.05	296.35	303.
324.07	224.22		481.582	6.07	299.95	305.32	306.22	296.35	307.
482.69	373.71		309.142	6.46	314.80	328.75	329.83	296.35	332.
482.69	373.71		-51002.390	6.01	300.00	299.91	300.99	296.35	303.
482.69	373.71		582.799	6.14	300.75	308.15	309.23	296.35	311.
671.03	514.89		235.342	6.65	314.80	340.05	341.58	295.95	344.
671.03	514.89		-4932.679	6.02	301.52	300.31	301.84	295.95	305.
671.03	514.89		669.411	6.19	302.55	311.42	312.95	295.95	316.
868.95	680.98		175.524	6.99	314.80	359.58	361.46	295.75	365.
868.95	680.98		-3562.713	6.04	303.38	301.18	303.06	295.75	307.
868.95	680.98		811.632	6.25	304.75	314.43	316.32	295.75	320.

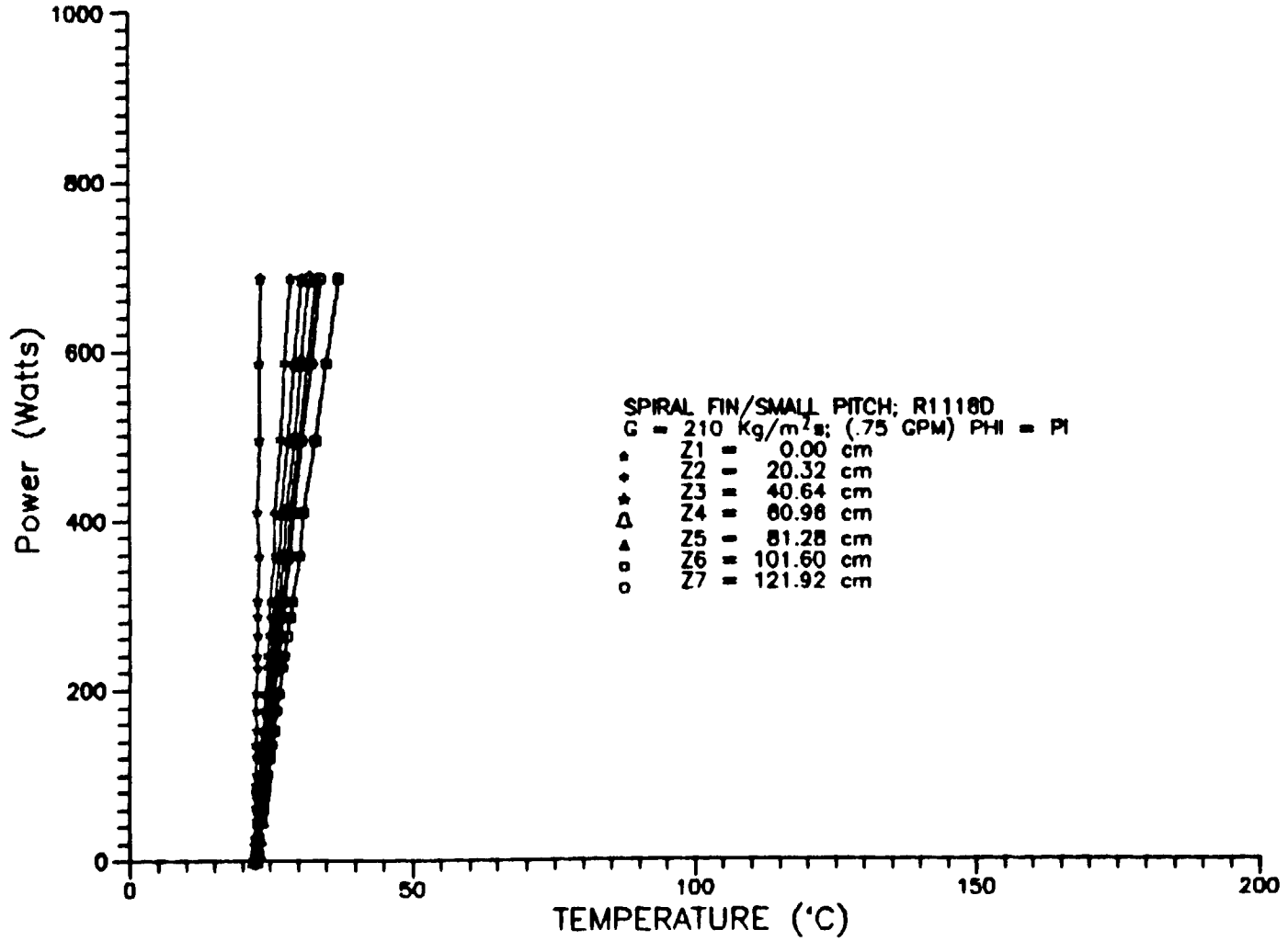

MEAN HEAT TRANSFER COEFFICIENTS
SPIRAL FIN SMALL PITCH ; AVG
Δ - G = 210 kg/m²s; 0.75 GPM
o - G = 281 kg/m²s; 1.00 GPM
h (W/m². K)
2500
2000
1500
1000
500
0
0
200
400
600
800
1000
Power (Watts)

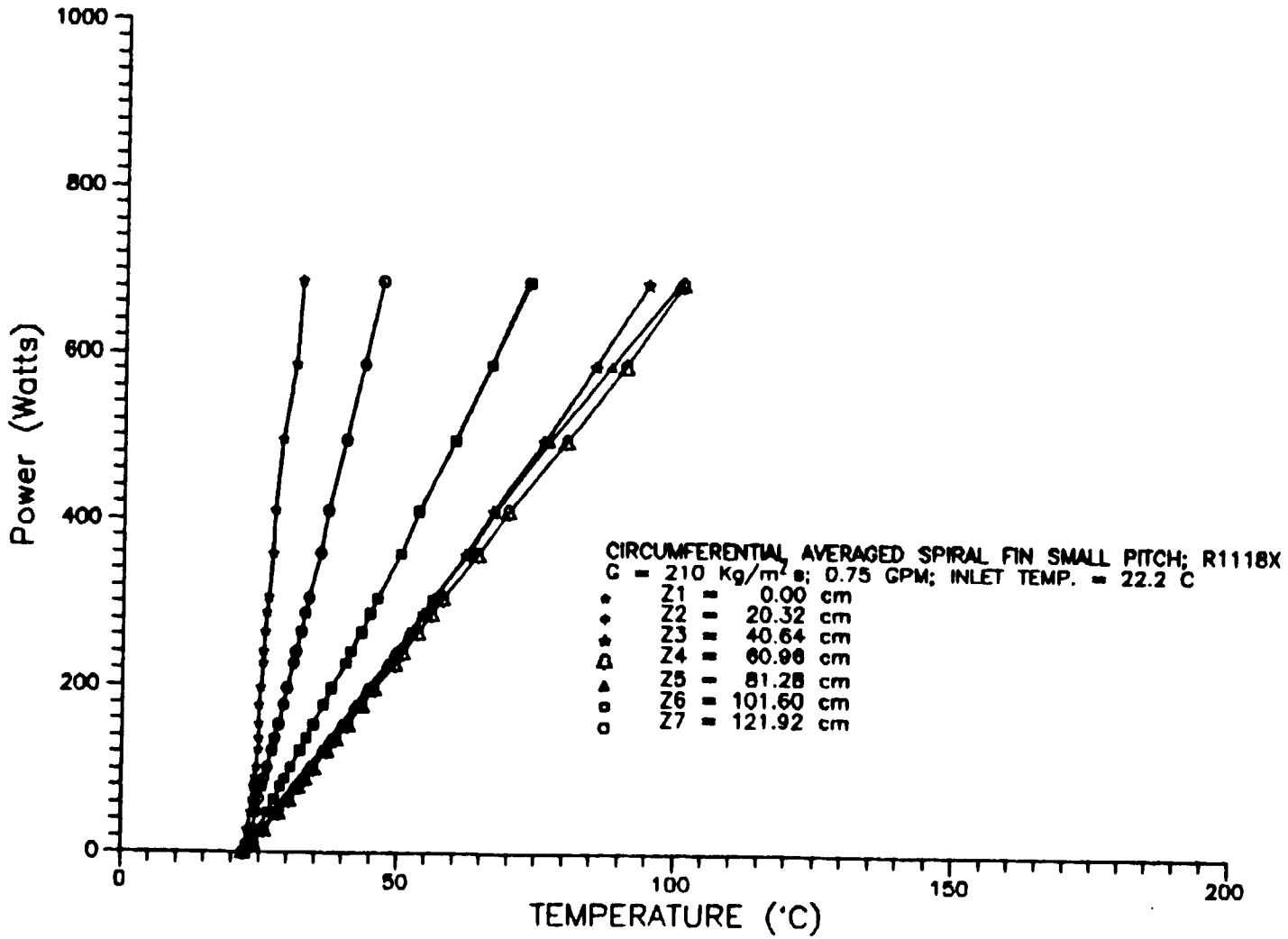

TEMPERATURE ('C)
50
40
30
20
10
0
0
200
400
600
800
1000
Power (Watts)
SPIRAL FIN/SMALL PITCH;(.75 GPM)
G = 210 Kg/m²s; R1118; INLET TEMP. = 22.2 C
▲ - INLET TEMPERATURE
● - EXIT TEMPERATURE

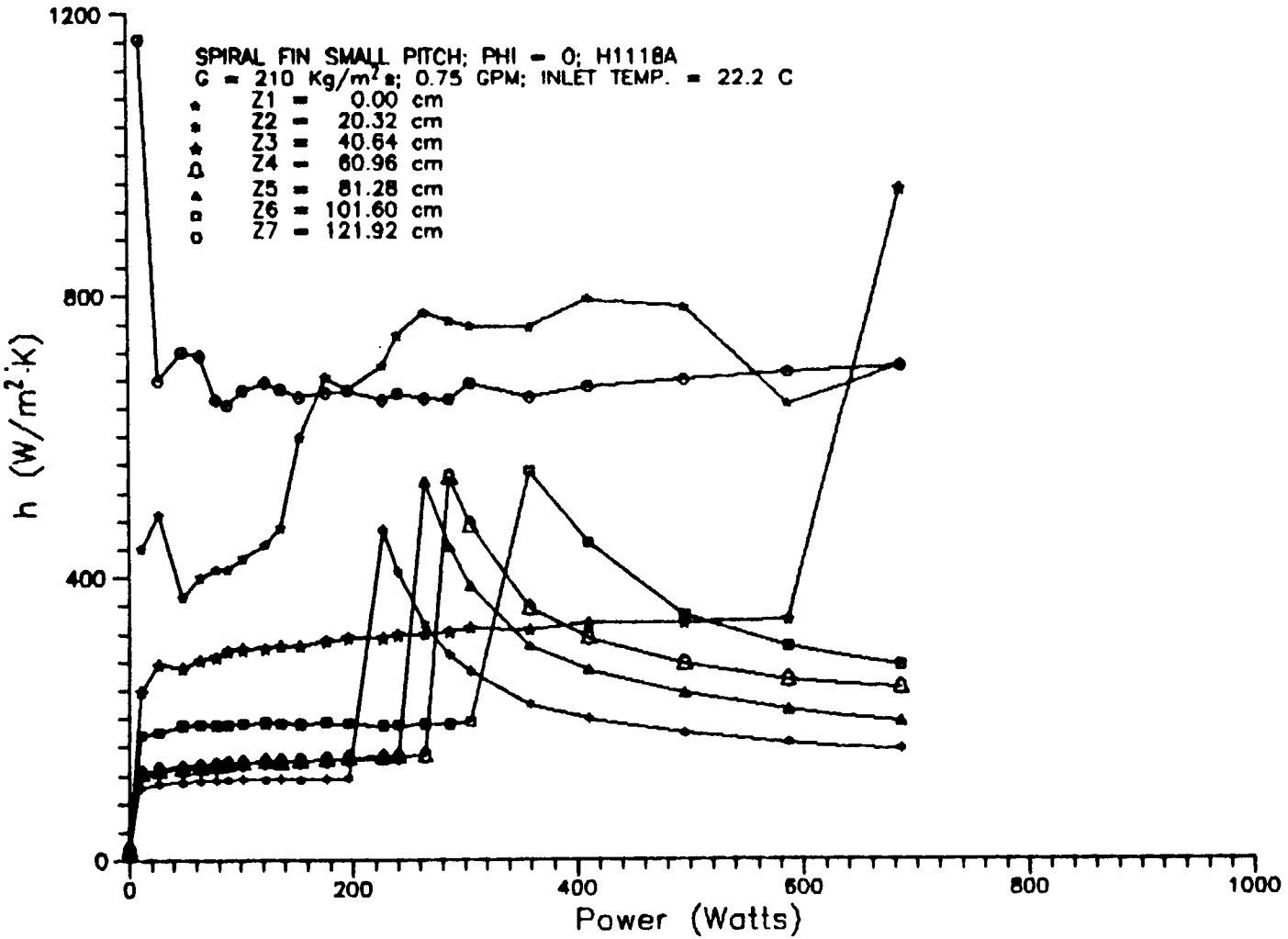

1000
800
600
400
200
0
Power (Watts)
0
50
100
150
200
TEMPERATURE (°C)
SPIRAL FIN/SMALL PITCH; R1118A
G = 210 Kg/m²s; (.75 GPM) PHI = 0
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

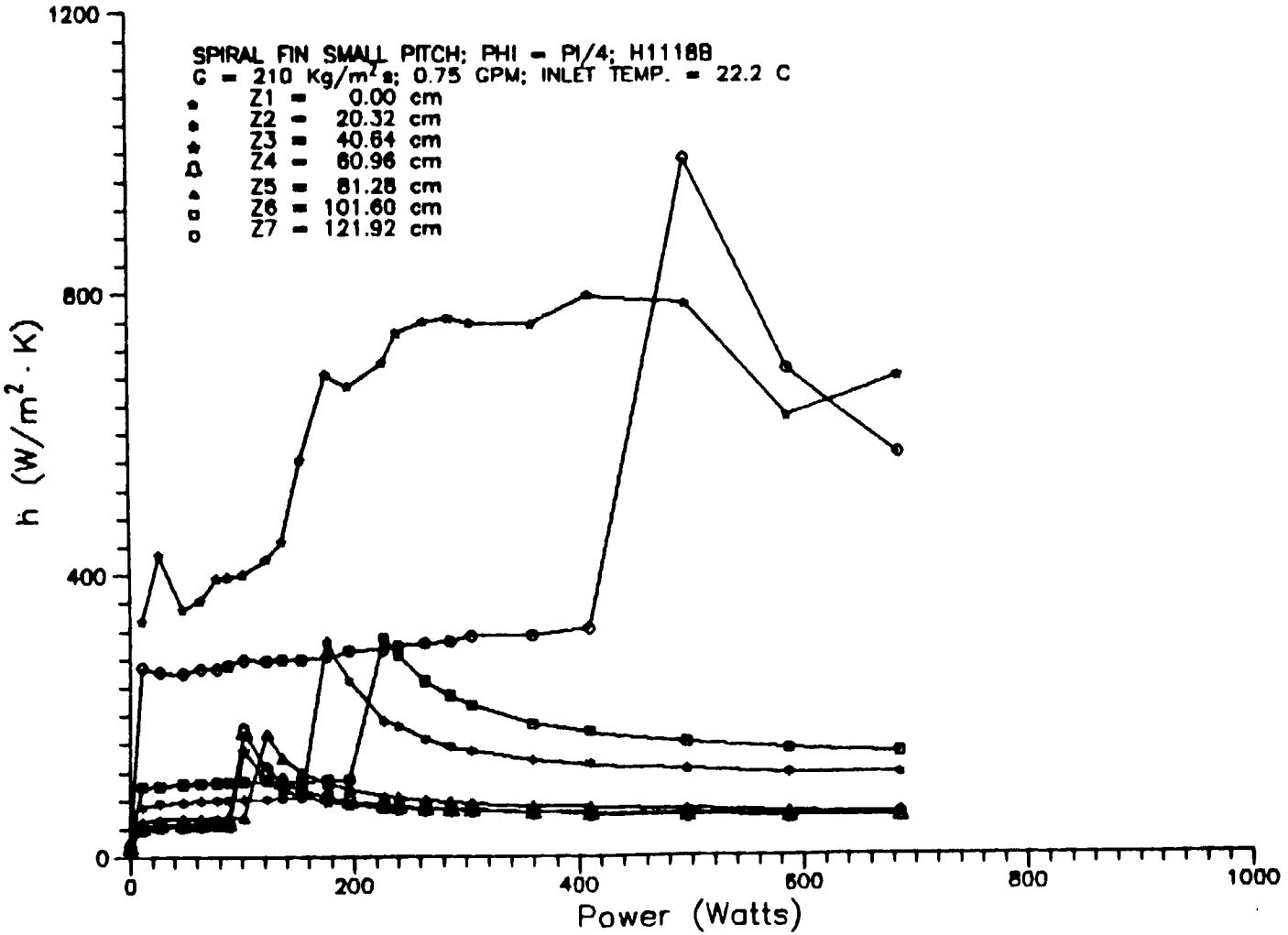

Power (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)
SPIRAL FIN/SMALL PITCH; R1118B
G = 210 Kg/m²s; (.75 GPM) PHI = PI/4
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

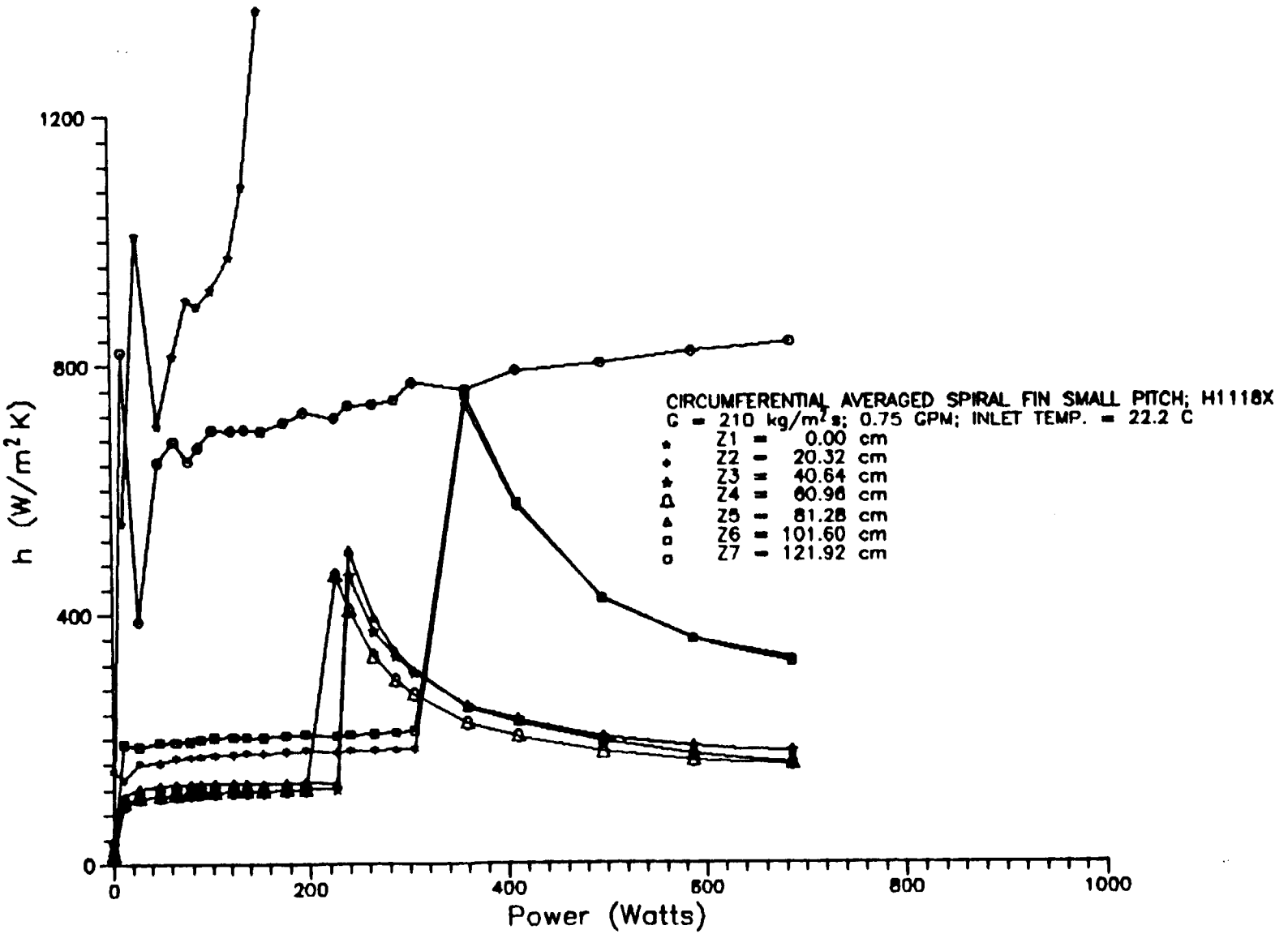

SPIRAL FIN/SMALL PITCH; R1118C
G = 210 Kg/m²s; (.75 GPM) PHI = 3PI/4
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
Power (Watts)
TEMPERATURE (°C)
0
200
400
600
800
1000
0
50
100
150
200

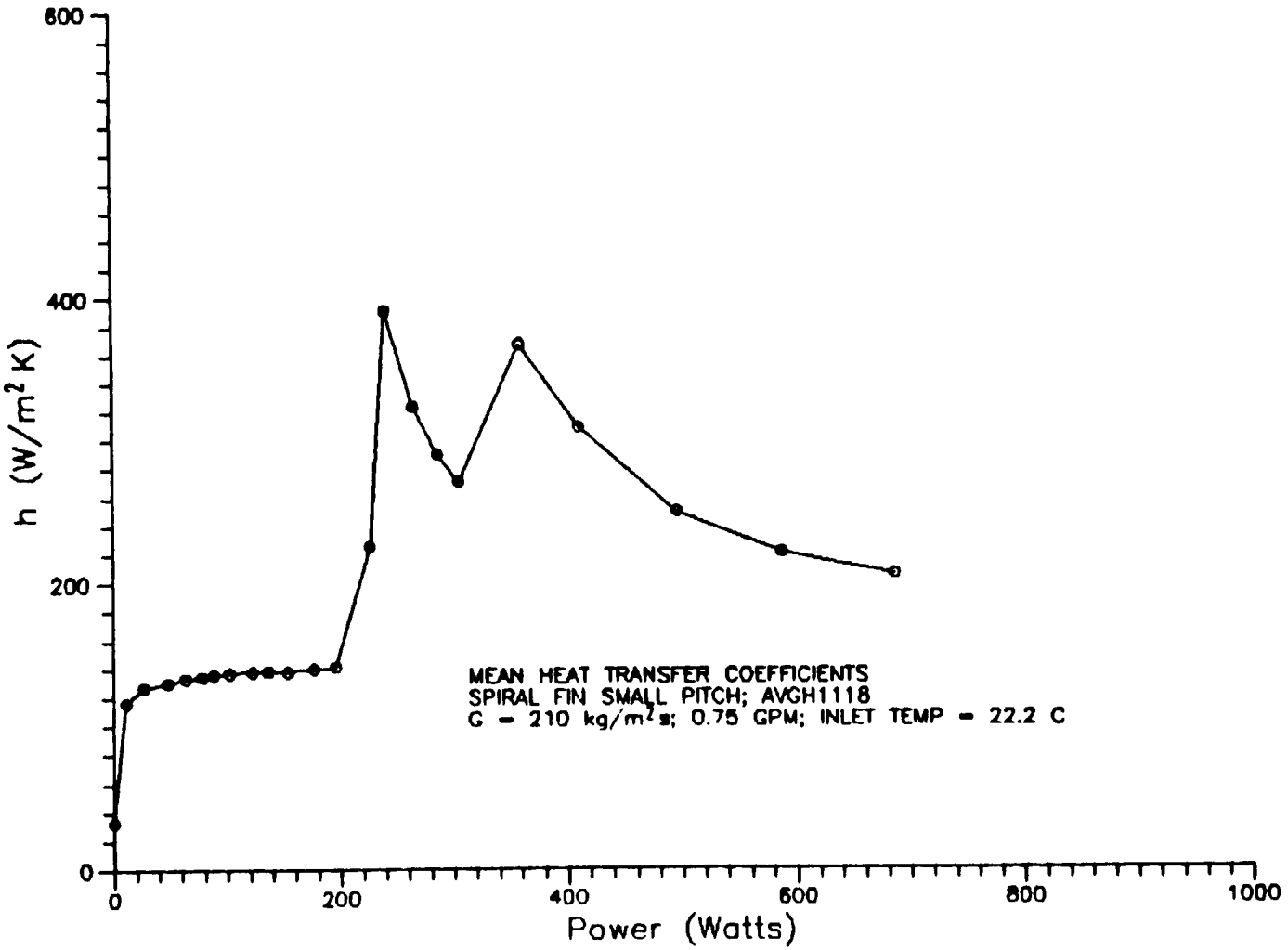

SPIRAL FIN/SMALL PITCH; R1118D
G = 210 Kg/m²s; (.75 GPM) PHI = PI
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
Power (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)


1000
800
600
400
200
0
Power (Watts)
0
50
100
150
200
TEMPERATURE (°C)
CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH; R1118X
G = 210 Kg/m² s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm


SPIRAL FIN SMALL PITCH; PHI = 0; H1118A
G = 210 Kg/m² s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m²·K)
1200
800
400
0
0
200
400
600
800
1000
Power (Watts)


SPIRAL FIN SMALL PITCH; PHI = PI/4; H1118B
G = 210 Kg/m²s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m² · K)
1200
800
400
0
0
200
400
600
800
1000
Power (Watts)


CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH; H1118X
G = 210 kg/m²s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m²K)
Power (Watts)
0
400
800
1200
0
200
400
600
800
1000


600
400
200
0
h (W/m² K)
0
200
400
600
800
1000
Power (Watts)
MEAN HEAT TRANSFER COEFFICIENTS
SPIRAL FIN SMALL PITCH; AVGH1118
G = 210 kg/m²s; 0.75 GPM; INLET TEMP = 22.2 C

H1118A.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-1775.744	-1775.744	16.038	16.038
10.86	440.207	102.266	238.506	123.740
26.81	488.092	108.416	276.539	127.713
47.82	371.978	110.009	271.874	128.952
63.47	399.799	112.194	282.750	132.097
78.01	411.185	112.641	287.628	133.786
88.36	411.341	113.558	295.636	136.475
101.87	427.044	114.847	298.694	137.116
122.11	446.234	114.244	299.615	139.272
136.17	470.781	114.864	302.982	138.953
153.10	598.134	114.315	303.213	140.675
176.70	684.779	115.100	310.211	142.015
196.10	667.143	115.624	314.278	144.237
226.85	701.486	467.437	314.385	145.844
240.54	743.877	408.945	318.407	146.476
264.73	776.733	332.549	319.784	147.890
286.92	764.760	289.951	322.920	543.242
305.37	757.037	266.819	328.521	474.670
358.87	755.955	220.223	326.025	356.140
410.33	796.158	200.122	335.057	315.471
495.60	785.158	178.859	334.916	278.350
586.73	646.483	165.621	340.541	255.587
685.93	702.935	156.309	953.104	244.534

H1118AA.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	16.038	16.038	-1775.744
10.86	119.971	176.692	1163.323
26.81	126.831	180.253	678.979
47.82	133.201	190.187	719.975
63.47	133.892	191.286	714.474
78.01	135.282	190.117	651.558
88.36	136.697	191.400	644.299
101.87	137.800	193.013	665.506
122.11	137.949	193.843	676.418
136.17	139.272	193.498	667.569
153.10	139.246	191.638	655.979
176.70	141.196	194.793	662.222
196.10	142.083	192.799	664.750
226.85	141.527	189.935	651.755
240.54	142.586	190.916	661.333
264.73	536.054	192.392	654.048
286.92	443.350	192.263	653.262
305.37	388.445	195.165	675.798
358.87	303.463	551.184	656.057
410.33	269.359	449.756	671.359
495.60	236.113	346.281	681.188
586.73	212.750	302.728	691.884
685.93	196.504	274.904	700.460

H1118B.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-1775.744	-1775.744	16.038	16.038
10.86	334.883	70.162	39.463	42.979
26.81	427.179	75.875	42.942	45.303
47.82	350.616	76.908	43.624	46.307
63.47	363.871	79.181	44.312	47.047
78.01	394.865	79.808	44.985	47.749
88.36	396.863	80.682	45.349	48.100
101.87	400.700	81.834	150.019	178.165
122.11	422.071	82.317	109.575	123.343
136.17	446.585	82.985	96.707	107.504
153.10	563.702	83.050	86.380	94.375
176.70	684.779	304.119	78.679	85.349
196.10	667.143	249.795	74.706	80.069
226.85	701.486	191.825	69.616	72.806
240.54	743.877	184.791	68.702	71.801
264.73	759.334	166.410	66.750	69.245
286.92	764.760	155.121	66.082	67.521
305.37	757.037	149.345	65.417	66.374
358.87	755.955	135.698	63.119	63.306
410.33	796.158	130.421	62.256	61.393
495.60	785.158	122.737	60.261	58.228
586.73	624.932	117.426	59.332	56.300
685.93	681.104	116.119	59.478	56.499

H1118BB.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	16.038	16.038	16.038
10.86	50.879	99.292	267.989
26.81	53.623	99.468	261.620
47.82	55.085	102.153	259.545
63.47	55.293	103.564	266.475
78.01	55.773	104.316	266.399
88.36	56.130	105.326	271.199
101.87	56.364	106.843	278.746
122.11	173.958	107.528	277.530
136.17	140.481	107.559	279.476
153.10	118.598	107.406	279.337
176.70	103.633	108.966	284.649
196.10	96.051	110.171	291.568
226.85	85.122	309.629	293.467
240.54	83.448	285.125	299.065
264.73	80.103	247.922	301.916
286.92	77.606	227.428	304.310
305.37	76.213	214.367	312.011
358.87	71.924	187.081	313.420
410.33	70.205	176.021	322.676
495.60	66.365	160.687	991.214
586.73	62.751	151.518	691.874
685.93	60.093	145.877	572.101

.00	-1775.744	148.999	16.038	16.038
10.86	546.512	135.297	93.557	97.976
26.81	1008.472	161.581	106.891	106.666
47.83	702.907	162.381	108.671	109.367
63.47	816.349	169.499	111.865	111.727
78.01	905.687	171.448	113.519	113.245
88.36	895.616	172.345	114.736	114.437
101.87	921.122	174.624	115.845	115.789
122.11	974.905	175.882	116.942	117.002
136.17	1087.680	178.084	117.580	117.583
153.10	1371.011	177.137	117.384	117.355
176.70	1833.918	180.068	119.306	119.189
196.10	1802.672	182.262	120.512	119.792
226.85	1850.390	179.445	120.751	462.655
240.54	2094.475	182.604	462.935	406.907
264.73	2143.249	182.439	372.644	332.982
286.92	2181.573	182.760	332.881	294.104
305.37	2130.668	183.940	306.309	271.304
358.87	2044.697	738.017	253.129	225.483
410.33	2378.746	573.255	231.621	205.030
495.60	2204.981	427.206	202.251	178.539
586.73	1656.326	361.696	187.535	164.317
685.93	1843.775	328.993	179.766	159.225

ATT3XX.DAT

.00	16.038	18.569	34.737
10.86	110.224	192.256	821.917
26.81	121.060	187.798	388.944
47.83	125.484	194.803	644.182
63.47	127.413	195.405	677.491
78.01	127.933	196.320	646.063
88.36	128.703	199.541	668.314
101.87	129.694	202.151	696.497
122.11	129.566	203.794	695.103
136.17	129.679	203.263	697.562
153.10	128.989	202.740	693.924
176.70	130.422	205.853	709.024
196.10	131.200	207.186	724.771
226.85	129.361	205.505	716.233
240.54	502.364	207.281	736.689
264.73	395.320	209.168	737.870
286.92	339.951	210.040	744.505
305.37	310.026	212.887	772.887
358.87	250.143	751.801	761.031
410.33	227.902	579.645	793.312
495.60	195.854	425.409	804.657
586.73	175.040	359.922	823.048
685.93	161.255	323.767	837.845

SPIRAL FIN SMALL PITCH; G = 210 kg/m s; PHI = 0

R1118A.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	.00		.000	5.87	295.25	295.25	295.25	296.05	295.
.00	.00		.000	5.87	295.25	295.25	295.25	296.05	295.
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.
10.86	24.91		897.048	5.88	295.35	295.67	295.59	296.15	295.
10.86	24.91		212.148	5.90	295.42	296.77	296.69	296.15	296.
10.86	24.91		489.159	5.89	295.48	296.07	295.99	296.15	296.
10.86	24.91		256.275	5.90	295.55	296.67	296.59	296.15	296.
26.81	31.14		509.113	5.87	295.35	296.06	296.05	295.65	296.
26.81	31.14		114.980	5.91	295.43	298.56	298.55	295.65	298.
26.81	31.14		289.789	5.88	295.52	296.76	296.75	295.65	296.
26.81	31.14		135.174	5.90	295.60	298.26	298.25	295.65	298.
47.82	56.06		391.227	5.92	295.35	297.00	296.99	296.45	297.
47.82	56.06		117.437	5.98	295.50	301.01	300.99	296.45	301.
47.82	56.06		286.896	5.94	295.65	297.90	297.89	296.45	298.
47.82	56.06		137.402	5.97	295.80	300.51	300.49	296.45	300.
63.47	68.51		387.484	5.93	295.35	297.39	297.41	296.45	297.
63.47	68.51		110.368	6.01	295.53	302.70	302.71	296.45	303.
63.47	68.51		274.960	5.95	295.72	298.59	298.61	296.45	299.
63.47	68.51		129.689	6.00	295.90	302.00	302.01	296.45	302.
78.01	68.51		324.591	5.92	295.35	297.79	297.91	296.15	298.
78.01	68.51		90.251	6.02	295.53	304.29	304.42	296.15	304.
78.01	68.51		227.780	5.94	295.72	299.19	299.31	296.15	299.
78.01	68.51		106.946	6.01	295.90	303.29	303.41	296.15	303.
88.36	80.97		338.507	5.95	295.35	298.11	298.23	296.65	298.
88.36	80.97		94.838	6.06	295.57	305.42	305.54	296.65	306.
88.36	80.97		244.023	5.97	295.78	299.61	299.73	296.65	300.
88.36	80.97		113.699	6.04	296.00	304.22	304.33	296.65	304.
101.87	93.43		351.985	5.94	295.35	298.41	298.55	296.35	299.
101.87	93.43		96.064	6.07	295.60	306.82	306.96	296.35	307.
101.87	93.43		246.966	5.97	295.85	300.22	300.35	296.35	300.
101.87	93.43		114.428	6.05	296.10	305.52	305.66	296.35	306.
122.11	112.11		367.958	5.98	295.35	298.87	299.03	296.85	299.
122.11	112.11		95.632	6.13	295.65	309.18	309.34	296.85	310.
122.11	112.11		247.885	6.01	295.95	301.17	301.33	296.85	302.
122.11	112.11		116.274	6.11	296.25	307.38	307.54	296.85	308.
136.17	124.57		386.978	5.96	295.35	299.07	299.25	296.45	300.
136.17	124.57		95.864	6.14	295.68	310.68	310.86	296.45	311.
136.17	124.57		249.927	6.00	296.02	301.77	301.95	296.45	302.
136.17	124.57		115.678	6.11	296.35	308.78	308.96	296.45	309.
153.10	137.03		480.470	5.97	295.35	298.64	298.86	296.65	299.
153.10	137.03		93.338	6.18	295.72	312.66	312.88	296.65	313.
153.10	137.03		244.667	6.03	296.08	302.55	302.77	296.65	303.
153.10	137.03		114.537	6.14	296.45	310.26	310.48	296.65	311.
176.70	155.71		541.316	5.98	295.35	298.67	298.94	296.95	299.
176.70	155.71		92.515	6.24	295.77	315.19	315.46	296.95	316.
176.70	155.71		246.405	6.06	296.18	303.48	303.75	296.95	304.
176.70	155.71		113.824	6.19	296.60	312.39	312.66	296.95	313.
196.10	168.17		513.455	5.98	295.35	299.13	299.46	296.65	300.
196.10	168.17		90.467	6.26	295.80	317.25	317.59	296.65	318.
196.10	168.17		242.996	6.06	296.25	304.24	304.57	296.65	305.
196.10	168.17		112.513	6.21	296.70	313.95	314.28	296.65	315.
226.85	193.08		535.964	5.97	295.35	299.51	299.90	296.35	301.
226.85	193.08		363.214	6.31	314.80	320.94	321.33	296.35	322.
226.85	193.08		241.351	6.07	296.38	305.62	306.01	296.35	307.
226.85	193.08		112.939	6.24	296.90	316.63	317.02	296.35	318.
240.54	205.54		570.474	5.98	295.35	299.51	299.92	296.45	301.

240.54	205.54	318.951	6.33	314.80	322.24	322.65	296.45	323.
240.54	205.54	245.375	6.08	296.45	306.12	306.53	296.45	307.
240.54	205.54	113.866	6.26	297.00	317.83	318.24	296.45	319.
264.73	224.22	590.419	5.99	295.35	299.73	300.20	296.45	301.
264.73	224.22	257.102	6.38	314.80	324.87	325.33	296.45	326.
264.73	224.22	244.286	6.10	296.55	307.14	307.61	296.45	309.
264.73	224.22	113.949	6.30	297.15	319.86	320.33	296.45	321.
286.92	236.68	566.361	5.98	295.35	300.17	300.72	296.05	302.
286.92	236.68	218.387	6.40	314.80	327.31	327.85	296.05	329.
286.92	236.68	240.302	6.10	296.62	307.98	308.53	296.05	310.
286.92	236.68	407.674	6.31	314.80	321.50	322.05	296.05	323.
305.37	261.59	581.907	6.03	295.35	300.54	301.06	297.05	302.
305.37	261.59	208.570	6.48	314.80	329.28	329.79	297.05	331.
305.37	261.59	253.713	6.16	296.75	308.65	309.17	297.05	310.
305.37	261.59	369.667	6.38	314.80	322.97	323.49	297.05	325.
358.87	305.19	577.202	6.01	295.35	301.45	302.08	296.15	304.
358.87	305.19	171.018	6.54	314.80	335.40	336.02	296.15	337.
358.87	305.19	250.119	6.16	296.98	311.06	311.69	296.15	313.
358.87	305.19	275.482	6.42	314.80	327.59	328.21	296.15	330.
410.33	330.11	574.776	6.06	295.35	301.98	302.81	297.05	304.
410.33	330.11	146.937	6.68	314.80	340.73	341.56	297.05	343.
410.33	330.11	243.023	6.23	297.12	312.79	313.63	297.05	315.
410.33	330.11	230.673	6.53	314.80	331.32	332.15	297.05	334.
495.60	411.08	584.776	6.04	295.35	303.46	304.39	295.85	307.
495.60	411.08	135.463	6.79	314.80	349.82	350.75	295.85	353.
495.60	411.08	250.607	6.24	297.55	316.48	317.41	295.85	320.
495.60	411.08	209.862	6.58	314.80	337.41	338.34	295.85	340.
586.73	492.05	487.175	6.09	295.35	307.01	308.07	295.55	311.
586.73	492.05	126.831	6.95	314.80	359.57	360.64	295.55	363.
586.73	492.05	257.638	6.30	297.98	320.02	321.09	295.55	324.
586.73	492.05	194.785	6.68	314.80	343.95	345.02	295.55	348.
685.93	566.79	521.750	6.13	295.35	307.89	309.19	295.85	312.
685.93	566.79	117.930	7.16	314.80	370.27	371.57	295.85	375.
685.93	566.79	710.398	6.38	314.80	324.01	325.31	295.85	328.
685.93	566.79	183.529	6.82	314.80	350.44	351.74	295.85	355.

SPIRAL FIN SMALL PITCH; G = 210 kg/m s; PHI = 0

R1118AA.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.	
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.	
.00	.00		.000	5.87	295.25	295.25	295.25	296.05	295.	
10.86	24.91		248.876	5.90	295.62	296.77	296.69	296.15	296.	
10.86	24.91		364.744	5.90	295.68	296.47	296.39	296.15	296.	
10.86	24.91		2378.015	5.89	295.75	295.87	295.79	296.15	295.	
26.81	31.14		134.331	5.90	295.68	298.36	298.35	295.65	298.	
26.81	31.14		190.021	5.89	295.77	297.66	297.65	295.65	297.	
26.81	31.14		709.647	5.87	295.85	296.36	296.35	295.65	296.	
47.82	56.06		141.928	5.97	295.95	300.51	300.49	296.45	300.	
47.82	56.06		201.743	5.96	296.10	299.31	299.29	296.45	299.	
47.82	56.06		757.513	5.92	296.25	297.10	297.09	296.45	297.	
63.47	68.51		131.489	6.00	296.08	302.10	302.11	296.45	302.	
63.47	68.51		187.009	5.98	296.27	300.49	300.51	296.45	300.	
63.47	68.51		692.841	5.93	296.45	297.59	297.61	296.45	298.	
78.01	68.51		108.167	6.01	296.08	303.39	303.51	296.15	303.	
78.01	68.51		151.350	5.98	296.27	301.49	301.61	296.15	302.	
78.01	68.51		514.577	5.93	296.45	297.99	298.11	296.15	298.	
88.36	80.97		113.931	6.05	296.22	304.42	304.53	296.65	305.	
88.36	80.97		158.846	6.02	296.43	302.32	302.43	296.65	302.	
88.36	80.97		530.532	5.96	296.65	298.41	298.53	296.65	299.	
101.87	93.43		115.039	6.06	296.35	305.72	305.86	296.35	306.	
101.87	93.43		160.454	6.02	296.60	303.32	303.45	296.35	304.	
101.87	93.43		548.913	5.95	296.85	298.81	298.95	296.35	299.	
122.11	112.11		115.237	6.11	296.55	307.78	307.94	296.85	308.	
122.11	112.11		161.242	6.07	296.85	304.87	305.03	296.85	305.	
122.11	112.11		558.250	5.99	297.15	299.47	299.63	296.85	300.	
136.17	124.57		115.989	6.12	296.68	309.08	309.26	296.45	310.	
136.17	124.57		160.494	6.07	297.02	305.97	306.15	296.45	306.	
136.17	124.57		549.378	5.98	297.35	299.97	300.15	296.45	300.	
153.10	137.03		113.440	6.15	296.82	310.76	310.98	296.65	311.	
153.10	137.03		155.503	6.10	297.18	307.35	307.57	296.65	308.	
153.10	137.03		528.093	6.00	297.55	300.54	300.77	296.65	301.	
176.70	155.71		113.225	6.20	297.02	312.89	313.16	296.95	314.	
176.70	155.71		155.588	6.14	297.43	308.98	309.26	296.95	310.	
176.70	155.71		524.849	6.02	297.85	301.27	301.55	296.95	302.	
196.10	168.17		110.904	6.22	297.15	314.65	314.98	296.65	316.	
196.10	168.17		149.927	6.15	297.60	310.54	310.88	296.65	311.	
196.10	168.17		512.862	6.02	298.05	301.83	302.17	296.65	303.	
226.85	193.08		109.692	6.26	297.42	317.73	318.12	296.35	319.	
226.85	193.08		146.675	6.18	297.93	313.13	313.52	296.35	314.	
226.85	193.08		499.294	6.03	298.45	302.91	303.31	296.35	304.	
240.54	205.54		110.933	6.28	297.55	318.93	319.35	296.45	320.	
240.54	205.54		148.003	6.21	298.10	314.13	314.54	296.45	315.	
240.54	205.54		508.590	6.04	298.65	303.31	303.73	296.45	305.	
264.73	224.22		413.365	6.32	314.80	321.06	321.53	296.45	322.	
264.73	224.22		147.836	6.23	298.35	315.85	316.32	296.45	317.	
264.73	224.22		498.630	6.05	298.95	304.14	304.61	296.45	306.	
286.92	236.68		333.024	6.33	314.80	323.00	323.55	296.05	325.	
286.92	236.68		143.922	6.24	298.52	317.50	318.04	296.05	319.	
286.92	236.68		485.165	6.05	299.15	304.78	305.33	296.05	306.	
305.37	261.59		302.837	6.41	314.80	324.77	325.29	297.05	326.	
305.37	261.59		151.617	6.31	298.85	318.76	319.28	297.05	320.	
305.37	261.59		520.909	6.10	299.55	305.34	305.86	297.05	307.	
358.87	305.19		234.995	6.45	314.80	329.79	330.41	296.15	332.	
358.87	305.19		425.392	6.35	314.80	323.08	323.70	296.15	325.	
358.87	305.19		502.365	6.10	300.25	307.26	307.88	296.15	309.	

410.33	330.11	197.198	6.57	314.80	334.12	334.96	297.05	337.
410.33	330.11	328.156	6.45	314.80	326.41	327.25	297.05	329.
410.33	330.11	486.043	6.16	300.65	308.49	309.32	297.05	311.
495.60	411.08	178.277	6.65	314.80	341.41	342.34	295.85	344.
495.60	411.08	260.661	6.51	314.80	333.00	333.93	295.85	336.
495.60	411.08	508.758	6.16	301.95	311.27	312.20	295.85	314.
586.73	492.05	162.429	6.78	314.80	349.76	350.83	295.55	353.
586.73	492.05	230.392	6.61	314.80	339.45	340.51	295.55	343.
586.73	492.05	522.509	6.20	303.25	314.12	315.18	295.55	318.
685.93	566.79	147.816	6.97	314.80	359.05	360.35	295.85	363.
685.93	566.79	206.110	6.75	314.80	346.54	347.84	295.85	351.
685.93	566.79	521.140	6.27	304.45	317.00	318.30	295.85	321.

SPIRAL FIN SMALL PITCH; G = 210 kg/m s; PHI = PI/4

R1118B.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	.00		.000	5.87	295.25	295.25	295.25	296.05	295.	
.00	.00		.000	5.87	295.25	295.25	295.25	296.05	295.	
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.	
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.	
10.86	24.91		683.475	5.89	295.35	295.77	295.69	296.15	295.	
10.86	24.91		146.991	5.91	295.42	297.37	297.29	296.15	297.	
10.86	24.91		84.782	5.93	295.48	298.87	298.79	296.15	298.	
10.86	24.91		92.023	5.93	295.55	298.67	298.59	296.15	298.	
26.81	31.14		445.873	5.87	295.35	296.16	296.15	295.65	296.	
26.81	31.14		81.177	5.93	295.43	299.86	299.85	295.65	300.	
26.81	31.14		46.992	5.98	295.52	303.17	303.16	295.65	303.	
26.81	31.14		49.473	5.97	295.60	302.86	302.86	295.65	303.	
47.82	56.06		368.896	5.92	295.35	297.10	297.09	296.45	297.	
47.82	56.06		82.816	6.02	295.50	303.31	303.29	296.45	303.	
47.82	56.06		48.031	6.11	295.65	309.12	309.10	296.45	309.	
47.82	56.06		50.866	6.10	295.80	308.52	308.50	296.45	308.	
63.47	68.51		352.856	5.93	295.35	297.59	297.61	296.45	298.	
63.47	68.51		78.536	6.05	295.53	305.60	305.62	296.45	306.	
63.47	68.51		44.940	6.17	295.72	313.31	313.33	296.45	313.	
63.47	68.51		47.603	6.16	295.90	312.51	312.53	296.45	312.	
78.01	68.51		311.779	5.93	295.35	297.89	298.01	296.15	298.	
78.01	68.51		64.465	6.08	295.53	307.80	307.92	296.15	308.	
78.01	68.51		37.132	6.22	295.72	317.01	317.13	296.15	317.	
78.01	68.51		39.319	6.20	295.90	316.01	316.13	296.15	316.	
88.36	80.97		326.659	5.95	295.35	298.21	298.33	296.65	298.	
88.36	80.97		67.920	6.12	295.57	309.32	309.44	296.65	309.	
88.36	80.97		39.009	6.29	295.78	319.74	319.85	296.65	320.	
88.36	80.97		41.280	6.27	296.00	318.64	318.75	296.65	319.	
101.87	93.43		330.384	5.95	295.35	298.61	298.75	296.35	299.	
101.87	93.43		68.986	6.14	295.60	311.23	311.36	296.35	311.	
101.87	93.43		129.208	6.33	314.80	323.15	323.28	296.35	323.	
101.87	93.43		153.087	6.31	314.80	321.84	321.98	296.35	322.	
122.11	112.11		348.135	5.98	295.35	299.07	299.23	296.85	299.	
122.11	112.11		69.428	6.21	295.65	314.29	314.44	296.85	315.	
122.11	112.11		94.414	6.44	314.80	328.50	328.66	296.85	329.	
122.11	112.11		106.034	6.41	314.80	327.00	327.16	296.85	327.	
136.17	124.57		367.183	5.97	295.35	299.27	299.45	296.45	300.	
136.17	124.57		69.776	6.23	295.68	316.29	316.47	296.45	317.	
136.17	124.57		83.066	6.48	314.80	332.11	332.29	296.45	333.	
136.17	124.57		92.126	6.45	314.80	330.41	330.59	296.45	331.	
153.10	137.03		452.914	5.97	295.35	298.84	299.06	296.65	299.	
153.10	137.03		68.309	6.28	295.72	318.87	319.09	296.65	319.	
153.10	137.03		72.575	6.56	314.80	336.59	336.81	296.65	337.	
153.10	137.03		79.119	6.53	314.80	334.79	335.01	296.65	335.	
176.70	155.71		541.316	5.98	295.35	298.67	298.94	296.95	299.	
176.70	155.71		246.178	6.35	314.80	322.10	322.37	296.95	323.	
176.70	155.71		65.050	6.68	314.80	342.43	342.70	296.95	343.	
176.70	155.71		70.409	6.64	314.80	340.32	340.60	296.95	341.	
196.10	168.17		513.455	5.98	295.35	299.13	299.46	296.65	300.	
196.10	168.17		196.785	6.38	314.80	324.66	324.99	296.65	326.	
196.10	168.17		60.103	6.74	314.80	347.09	347.42	296.65	348.	
196.10	168.17		64.290	6.71	314.80	344.99	345.32	296.65	346.	
226.85	193.08		535.964	5.97	295.35	299.51	299.90	296.35	301.	
226.85	193.08		150.095	6.44	314.80	329.65	330.04	296.35	331.	
226.85	193.08		55.599	6.86	314.80	354.88	355.27	296.35	356.	
226.85	193.08		58.065	6.83	314.80	353.18	353.57	296.35	354.	
240.54	205.54		570.474	5.98	295.35	299.51	299.92	296.45	301.	

240.54	205.54	145.095	6.48	314.80	331.15	331.56	296.45	332.
240.54	205.54	55.059	6.92	314.80	357.88	358.30	296.45	359.
240.54	205.54	57.463	6.89	314.80	356.08	356.49	296.45	357.
264.73	224.22	577.232	5.99	295.35	299.83	300.30	296.45	301.
264.73	224.22	129.532	6.54	314.80	334.78	335.24	296.45	336.
264.73	224.22	53.012	7.02	314.80	363.62	364.08	296.45	365.
264.73	224.22	54.927	6.99	314.80	361.91	362.38	296.45	363.
286.92	236.68	566.361	5.98	295.35	300.17	300.72	296.05	302.
286.92	236.68	117.630	6.57	314.80	338.02	338.57	296.05	340.
286.92	236.68	51.094	7.09	314.80	368.26	368.81	296.05	370.
286.92	236.68	52.169	7.07	314.80	367.16	367.71	296.05	369.
305.37	261.59	581.907	6.03	295.35	300.54	301.06	297.05	302.
305.37	261.59	117.521	6.66	314.80	340.49	341.01	297.05	342.
305.37	261.59	52.478	7.21	314.80	372.33	372.85	297.05	374.
305.37	261.59	53.219	7.20	314.80	371.53	372.05	297.05	373.
358.87	305.19	577.202	6.01	295.35	301.45	302.08	296.15	304.
358.87	305.19	106.053	6.75	314.80	348.01	348.64	296.15	350.
358.87	305.19	50.275	7.40	314.80	384.86	385.48	296.15	387.
358.87	305.19	50.419	7.39	314.80	384.66	385.28	296.15	387.
410.33	330.11	574.776	6.06	295.35	301.98	302.81	297.05	304.
410.33	330.11	96.339	6.91	314.80	354.35	355.18	297.05	357.
410.33	330.11	46.861	7.66	314.80	396.10	396.94	297.05	398.
410.33	330.11	46.235	7.68	314.80	397.20	398.04	297.05	400.
495.60	411.08	584.776	6.04	295.35	303.46	304.39	295.85	307.
495.60	411.08	93.496	7.06	314.80	365.54	366.47	295.85	369.
495.60	411.08	46.783	7.99	314.80	416.21	417.14	295.85	419.
495.60	411.08	45.264	8.05	314.80	419.61	420.54	295.85	423.
586.73	492.05	470.992	6.10	295.35	307.41	308.47	295.55	311.
586.73	492.05	90.429	7.26	314.80	377.60	378.66	295.55	381.
586.73	492.05	46.557	8.39	314.80	436.77	437.84	295.55	440.
586.73	492.05	44.267	8.52	314.80	443.08	444.15	295.55	447.
685.93	566.79	505.598	6.14	295.35	308.29	309.59	295.85	313.
685.93	566.79	88.049	7.50	314.80	389.09	390.39	295.85	393.
685.93	566.79	45.942	8.84	314.80	457.18	458.48	295.85	461.
685.93	566.79	43.728	8.99	314.80	464.39	465.69	295.85	469.

SPIRAL FIN SMALL PITCH; G = 210 kg/m s; PHI = PI/4

R1118BB.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.	
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.	
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.	
10.86	24.91		108.206	5.92	295.62	298.27	298.19	296.15	298.	
10.86	24.91		206.993	5.91	295.68	297.07	296.99	296.15	297.	
10.86	24.91		551.428	5.89	295.75	296.27	296.19	296.15	296.	
26.81	31.14		58.157	5.96	295.68	301.86	301.86	295.65	302.	
26.81	31.14		105.917	5.92	295.77	299.16	299.15	295.65	299.	
26.81	31.14		274.882	5.89	295.85	297.16	297.15	295.65	297.	
47.82	56.06		60.090	6.07	295.95	306.72	306.70	296.45	307.	
47.82	56.06		109.461	6.00	296.10	302.01	301.99	296.45	302.	
47.82	56.06		274.598	5.95	296.25	298.61	298.59	296.45	298.	
63.47	68.51		55.589	6.13	296.08	310.31	310.32	296.45	310.	
63.47	68.51		102.255	6.03	296.27	304.00	304.01	296.45	304.	
63.47	68.51		259.786	5.96	296.45	299.49	299.51	296.45	299.	
78.01	68.51		45.645	6.16	296.08	313.41	313.53	296.15	313.	
78.01	68.51		83.852	6.04	296.27	305.70	305.82	296.15	306.	
78.01	68.51		211.449	5.96	296.45	300.19	300.31	296.15	300.	
88.36	80.97		47.881	6.22	296.22	315.73	315.85	296.65	316.	
88.36	80.97		88.250	6.09	296.43	307.02	307.14	296.65	307.	
88.36	80.97		224.393	5.99	296.65	300.81	300.93	296.65	301.	
101.87	93.43		48.158	6.26	296.35	318.74	318.87	296.35	319.	
101.87	93.43		89.654	6.10	296.60	308.63	308.76	296.35	309.	
101.87	93.43		230.997	5.99	296.85	301.52	301.65	296.35	302.	
122.11	112.11		148.757	6.36	314.80	323.50	323.66	296.85	324.	
122.11	112.11		90.276	6.16	296.85	311.18	311.34	296.85	312.	
122.11	112.11		230.147	6.04	297.15	302.77	302.93	296.85	303.	
136.17	124.57		119.798	6.39	314.80	326.80	326.98	296.45	327.	
136.17	124.57		90.041	6.18	297.02	312.98	313.16	296.45	313.	
136.17	124.57		231.079	6.03	297.35	303.57	303.75	296.45	304.	
153.10	137.03		98.946	6.47	314.80	330.78	331.00	296.65	331.	
153.10	137.03		87.955	6.22	297.18	315.16	315.38	296.65	316.	
153.10	137.03		225.926	6.06	297.55	304.55	304.77	296.65	305.	
176.70	155.71		85.098	6.57	314.80	335.92	336.19	296.95	337.	
176.70	155.71		87.826	6.28	297.43	317.89	318.17	296.95	319.	
176.70	155.71		226.624	6.09	297.85	305.78	306.05	296.95	307.	
196.10	168.17		76.766	6.63	314.80	340.08	340.41	296.65	341.	
196.10	168.17		86.423	6.30	297.60	320.06	320.39	296.65	321.	
196.10	168.17		225.928	6.09	298.05	306.64	306.97	296.65	308.	
226.85	193.08		67.588	6.74	314.80	347.77	348.16	296.35	349.	
226.85	193.08		241.187	6.36	314.80	324.04	324.43	296.35	325.	
226.85	193.08		225.772	6.11	298.45	308.32	308.71	296.35	309.	
240.54	205.54		66.495	6.79	314.80	350.47	350.89	296.45	352.	
240.54	205.54		222.915	6.38	314.80	325.44	325.85	296.45	327.	
240.54	205.54		230.947	6.12	298.65	308.92	309.33	296.45	310.	
264.73	224.22		63.263	6.89	314.80	355.70	356.17	296.45	357.	
264.73	224.22		192.120	6.43	314.80	328.27	328.74	296.45	330.	
264.73	224.22		231.103	6.15	298.95	310.15	310.61	296.45	312.	
286.92	236.68		59.705	6.95	314.80	360.55	361.10	296.05	362.	
286.92	236.68		171.664	6.45	314.80	330.71	331.26	296.05	332.	
286.92	236.68		226.904	6.15	299.15	311.19	311.73	296.05	313.	
305.37	261.59		60.843	7.07	314.80	364.42	364.94	297.05	366.	
305.37	261.59		167.916	6.54	314.80	332.78	333.30	297.05	334.	
305.37	261.59		241.441	6.21	299.55	312.05	312.57	297.05	314.	
358.87	305.19		57.042	7.25	314.80	376.55	377.17	296.15	379.	
358.87	305.19		145.545	6.60	314.80	339.00	339.62	296.15	341.	
358.87	305.19		240.903	6.22	300.25	314.87	315.49	296.15	317.	

410.33	330.11	52.630	7.49	314.80	387.19	388.02	297.05	390.
410.33	330.11	129.441	6.74	314.80	344.23	345.07	297.05	347.
410.33	330.11	234.460	6.30	300.65	316.90	317.73	297.05	319.
495.60	411.08	51.346	7.81	314.80	407.20	408.13	295.85	410.
495.60	411.08	121.874	6.85	314.80	353.73	354.66	295.85	357.
495.60	411.08	742.949	6.32	314.80	321.19	322.12	295.85	324.
586.73	492.05	49.138	8.26	314.80	430.37	431.43	295.55	434.
586.73	492.05	116.179	7.02	314.80	363.68	364.75	295.55	367.
586.73	492.05	524.333	6.38	314.80	325.63	326.70	295.55	329.
685.93	566.79	46.399	8.81	314.80	455.78	457.08	295.85	460.
685.93	566.79	110.174	7.23	314.80	374.17	375.47	295.85	379.
685.93	566.79	427.095	6.48	314.80	330.12	331.42	295.85	335.

CIRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH; H1118
R1118X.TER

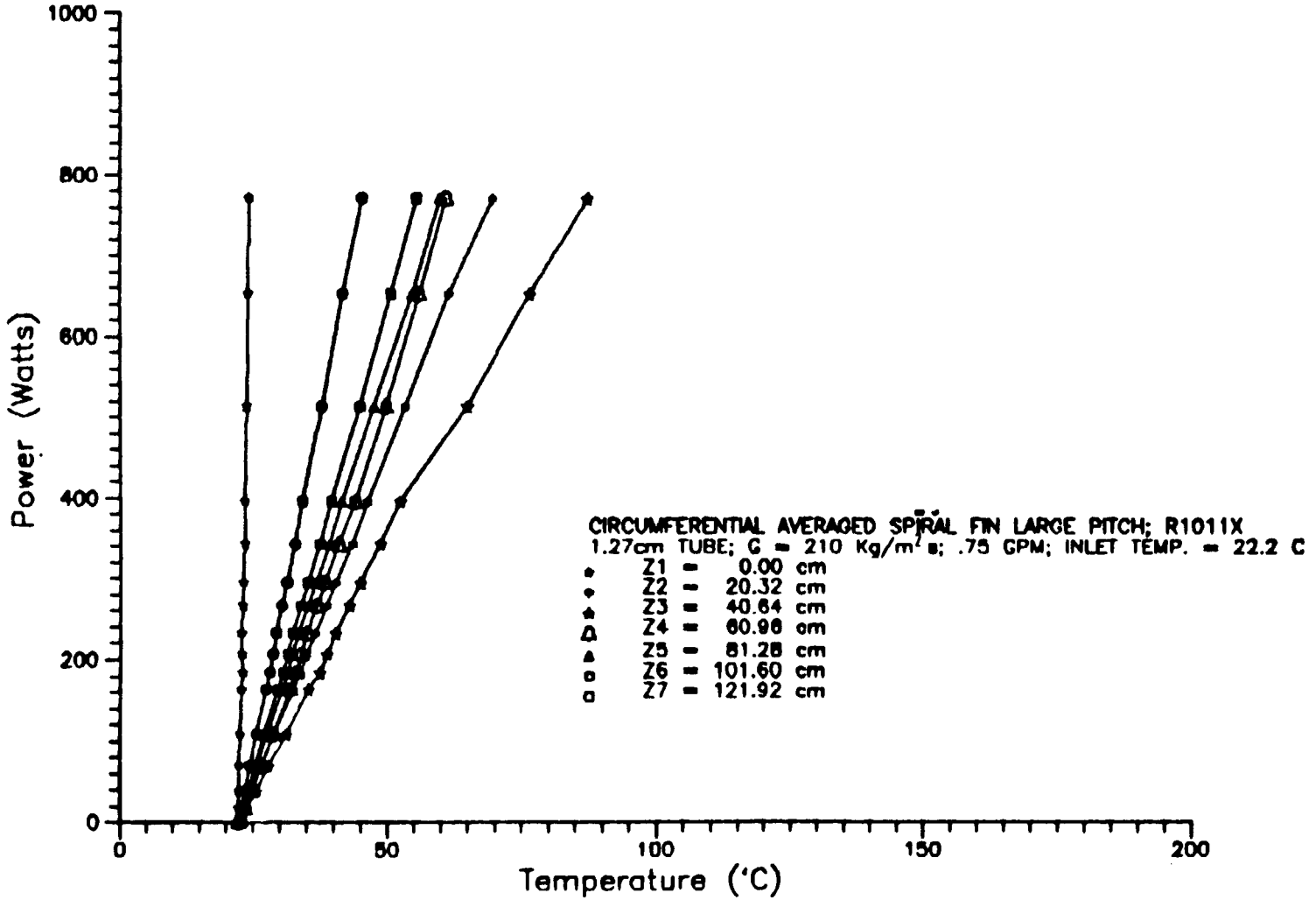
A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	.00		.000	5.87	295.25	295.25	295.25	296.05	295.
.00	.00		.000	5.87	295.25	295.26	295.26	296.05	295.
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.
10.86	24.91		1112.492	5.88	295.35	295.61	295.53	296.15	295.
10.86	24.91		279.178	5.90	295.42	296.45	296.36	296.15	296.
10.86	24.91		194.679	5.90	295.48	296.96	296.88	296.15	297.
10.86	24.91		203.875	5.90	295.55	296.96	296.88	296.15	297.
26.81	31.14		1049.390	5.86	295.35	295.69	295.68	295.65	295.
26.81	31.14		170.212	5.89	295.43	297.54	297.54	295.65	297.
26.81	31.14		113.460	5.91	295.52	298.68	298.68	295.65	298.
26.81	31.14		113.288	5.91	295.60	298.77	298.76	295.65	298.
47.83	56.06		737.177	5.91	295.35	296.23	296.21	296.45	296.
47.83	56.06		172.215	5.96	295.50	299.26	299.24	296.45	299.
47.83	56.06		116.102	5.99	295.65	301.22	301.21	296.45	301.
47.83	56.06		116.894	5.99	295.80	301.33	301.32	296.45	301.
63.47	68.51		788.913	5.91	295.35	296.35	296.37	296.45	296.
63.47	68.51		165.621	5.97	295.53	300.31	300.32	296.45	300.
63.47	68.51		110.106	6.01	295.72	302.90	302.91	296.45	303.
63.47	68.51		110.029	6.02	295.90	303.09	303.10	296.45	303.
78.01	68.51		712.817	5.90	295.35	296.46	296.58	296.15	297.
78.01	68.51		136.438	5.98	295.53	301.33	301.45	296.15	301.
78.01	68.51		90.979	6.02	295.72	304.41	304.53	296.15	304.
78.01	68.51		90.801	6.03	295.90	304.61	304.73	296.15	305.
88.36	80.97		734.838	5.93	295.35	296.62	296.74	296.65	297.
88.36	80.97		142.970	6.01	295.57	302.10	302.22	296.65	302.
88.36	80.97		95.843	6.06	295.78	305.53	305.65	296.65	306.
88.36	80.97		95.639	6.07	296.00	305.77	305.89	296.65	306.
101.87	93.43		757.058	5.92	295.35	296.77	296.91	296.35	297.
101.87	93.43		145.093	6.01	295.60	303.03	303.16	296.35	303.
101.87	93.43		96.924	6.07	295.85	306.97	307.11	296.35	307.
101.87	93.43		96.920	6.08	296.10	307.22	307.36	296.35	307.
122.11	112.11		801.687	5.95	295.35	296.96	297.12	296.85	297.
122.11	112.11		146.222	6.06	295.65	304.50	304.66	296.85	305.
122.11	112.11		97.888	6.13	295.95	309.17	309.33	296.85	310.
122.11	112.11		97.981	6.14	296.25	309.45	309.61	296.85	310.
136.17	124.57		891.629	5.93	295.35	296.96	297.14	296.45	297.
136.17	124.57		147.602	6.06	295.68	305.42	305.60	296.45	306.
136.17	124.57		98.129	6.14	296.02	310.67	310.85	296.45	311.
136.17	124.57		98.174	6.14	296.35	310.99	311.17	296.45	311.
153.10	137.03		1098.946	5.94	295.35	296.79	297.01	296.65	297.
153.10	137.03		143.630	6.09	295.72	306.73	306.95	296.65	307.
153.10	137.03		95.835	6.18	296.08	312.58	312.81	296.65	313.
153.10	137.03		95.852	6.19	296.45	312.95	313.17	296.65	314.
176.70	155.71		1446.701	5.95	295.35	296.59	296.86	296.95	297.
176.70	155.71		143.723	6.13	295.77	308.27	308.54	296.95	309.
176.70	155.71		95.870	6.23	296.18	314.93	315.20	296.95	316.
176.70	155.71		95.818	6.24	296.60	315.35	315.63	296.95	316.
196.10	168.17		1384.439	5.94	295.35	296.75	297.08	296.65	298.
196.10	168.17		141.599	6.14	295.80	309.51	309.84	296.65	310.
196.10	168.17		94.255	6.25	296.25	316.84	317.17	296.65	318.
196.10	168.17		93.740	6.26	296.70	317.40	317.74	296.65	318.
226.85	193.08		1410.935	5.94	295.35	296.93	297.32	296.35	298.
226.85	193.08		138.448	6.17	295.87	311.96	312.36	296.35	313.
226.85	193.08		93.768	6.29	296.38	320.15	320.54	296.35	321.
226.85	193.08		359.516	6.31	314.80	321.00	321.39	296.35	322.
240.54	205.54		1603.075	5.94	295.35	296.83	297.24	296.45	298.

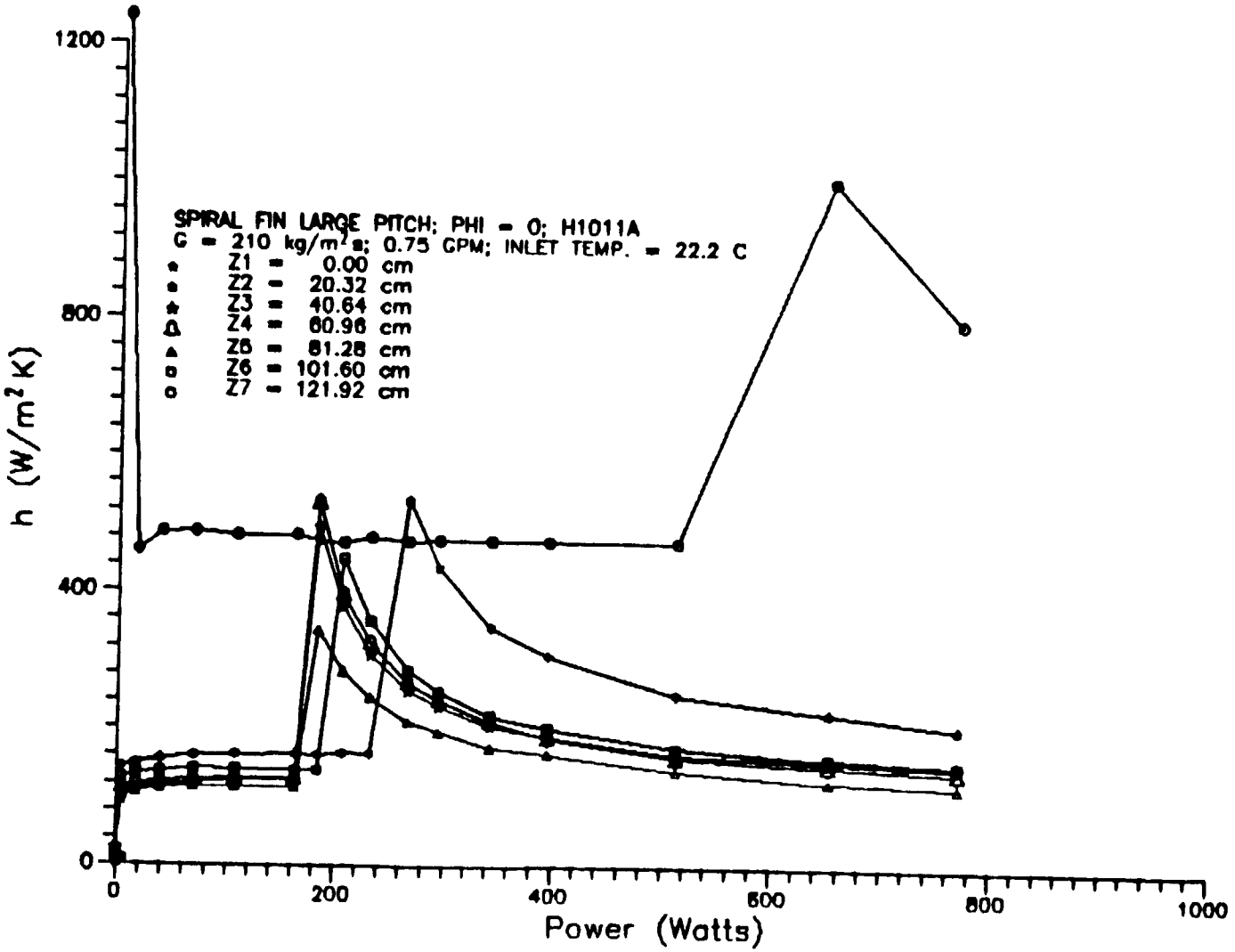
240.54	205.54	141.406	6.18	295.90	312.68	313.09	296.45	314.
240.54	205.54	360.824	6.32	314.80	321.37	321.79	296.45	323.
240.54	205.54	317.369	6.33	314.80	322.27	322.69	296.45	323.
264.73	224.22	1626.126	5.94	295.35	296.94	297.41	296.45	298.
264.73	224.22	140.053	6.21	295.95	314.43	314.89	296.45	316.
264.73	224.22	287.889	6.36	314.80	323.79	324.26	296.45	325.
264.73	224.22	257.434	6.38	314.80	324.85	325.32	296.45	326.
286.92	236.68	1612.510	5.93	295.35	297.04	297.59	296.05	299.
286.92	236.68	136.678	6.22	295.98	315.97	316.51	296.05	318.
286.92	236.68	250.469	6.37	314.80	325.71	326.25	296.05	327.
286.92	236.68	221.491	6.40	314.80	327.13	327.68	296.05	329.
305.37	261.59	1634.621	5.98	295.35	297.20	297.72	297.05	299.
305.37	261.59	142.765	6.29	296.05	317.20	317.72	297.05	319.
305.37	261.59	239.177	6.45	314.80	327.42	327.94	297.05	329.
305.37	261.59	212.046	6.48	314.80	329.04	329.56	297.05	331.
358.87	305.19	1558.263	5.95	295.35	297.61	298.23	296.15	300.
358.87	305.19	568.993	6.31	314.80	320.99	321.61	296.15	323.
358.87	305.19	196.309	6.50	314.80	332.74	333.37	296.15	335.
358.87	305.19	175.061	6.54	314.80	334.92	335.54	296.15	337.
410.33	330.11	1714.046	6.00	295.35	297.57	298.41	297.05	300.
410.33	330.11	417.810	6.41	314.80	323.92	324.75	297.05	326.
410.33	330.11	169.802	6.62	314.80	337.24	338.07	297.05	340.
410.33	330.11	150.499	6.67	314.80	340.11	340.95	297.05	343.
495.60	411.08	1639.197	5.96	295.35	298.24	299.17	295.85	301.
495.60	411.08	321.177	6.45	314.80	329.57	330.50	295.85	333.
495.60	411.08	152.955	6.72	314.80	345.82	346.75	295.85	349.
495.60	411.08	135.223	6.79	314.80	349.88	350.81	295.85	353.
586.73	492.05	1245.507	5.98	295.35	299.91	300.98	295.55	304.
586.73	492.05	274.933	6.54	314.80	335.46	336.52	295.55	339.
586.73	492.05	143.383	6.86	314.80	354.41	355.47	295.55	358.
586.73	492.05	125.846	6.95	314.80	359.92	360.99	295.55	364.
685.93	566.79	1365.802	6.01	295.35	300.14	301.44	295.85	305.
685.93	566.79	246.328	6.67	314.80	341.36	342.66	295.85	346.
685.93	566.79	135.371	7.04	314.80	363.12	364.42	295.85	368.
685.93	566.79	120.098	7.14	314.80	369.27	370.57	295.85	374.

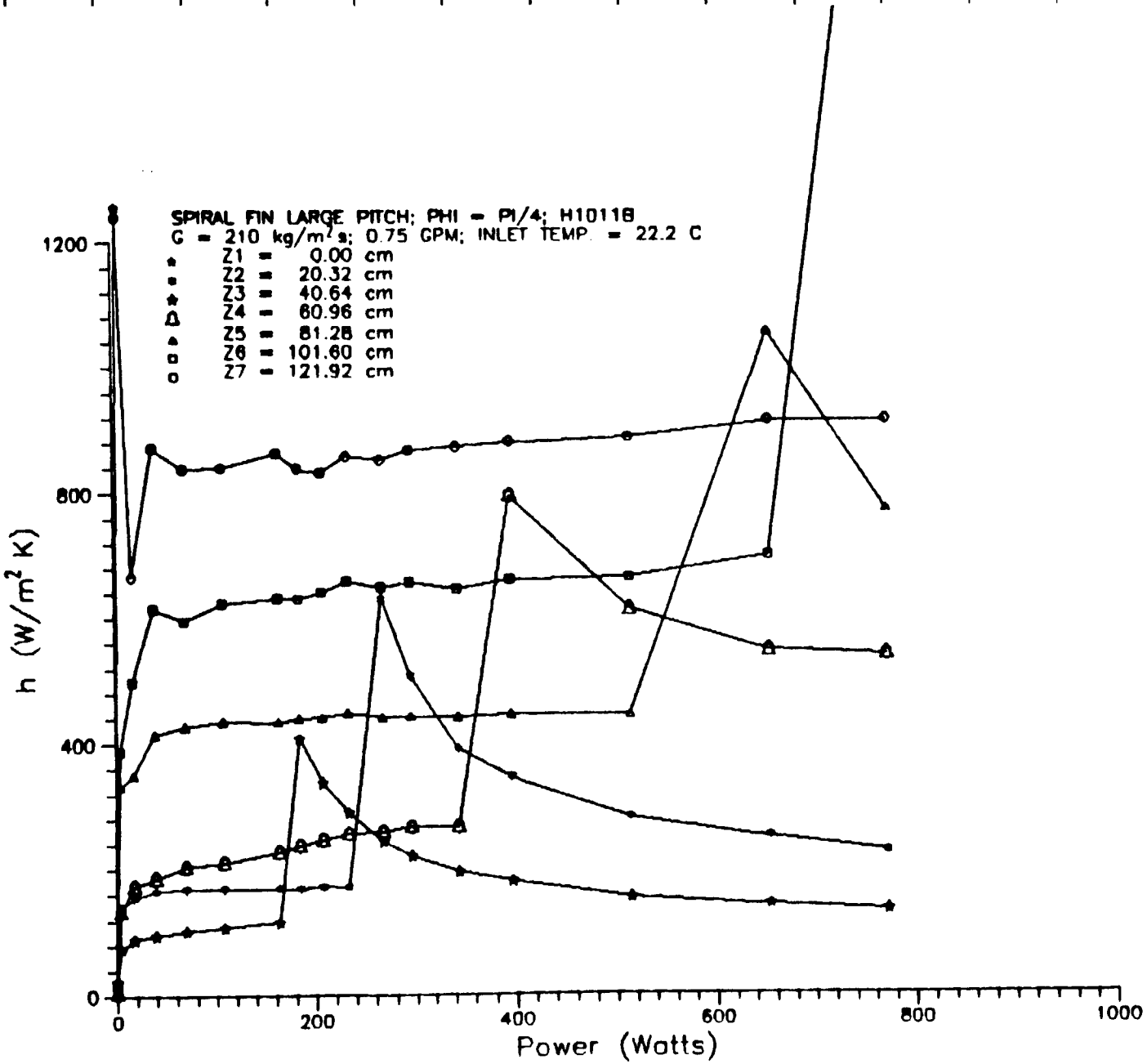
IRCUMFERENTIAL AVERAGED SPIRAL FIN SMALL PITCH; H1118XX
R1118XX.TER

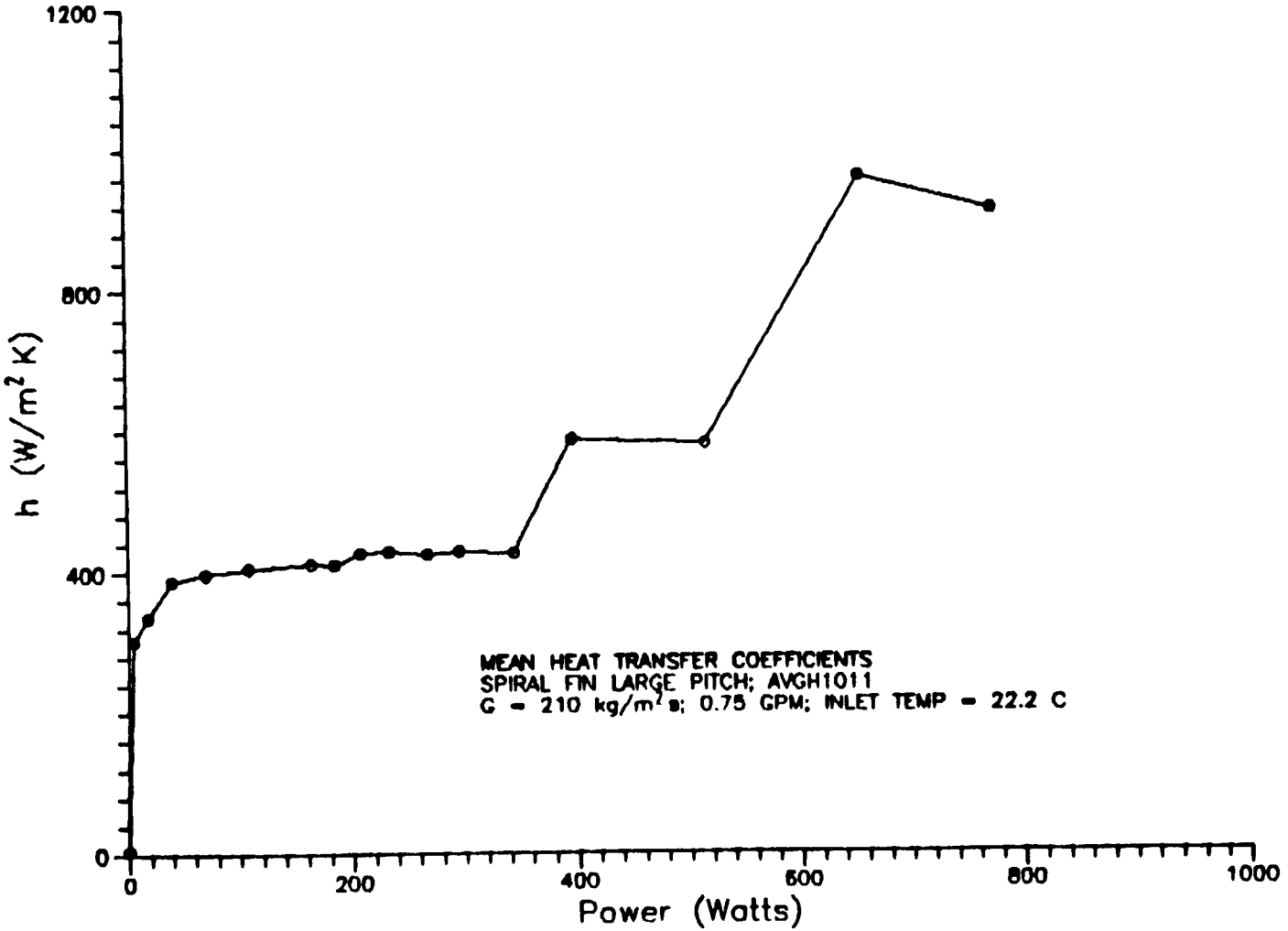
A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	.00		.000	5.87	295.25	295.35	295.35	296.05	295.	
.00	.00		.000	5.87	295.25	295.34	295.34	296.05	295.	
.00	.00		.000	5.87	295.25	295.30	295.30	296.05	295.	
10.86	24.91		229.027	5.90	295.62	296.87	296.79	296.15	296.	
10.86	24.91		396.469	5.90	295.68	296.41	296.33	296.15	296.	
10.86	24.91		1681.545	5.89	295.75	295.92	295.84	296.15	296.	
26.81	31.14		128.327	5.91	295.68	298.48	298.48	295.65	298.	
26.81	31.14		197.878	5.89	295.77	297.58	297.58	295.65	297.	
26.81	31.14		407.519	5.88	295.85	296.73	296.72	295.65	296.	
47.83	56.06		133.844	5.98	295.95	300.78	300.77	296.45	301.	
47.83	56.06		206.582	5.96	296.10	299.23	299.21	296.45	299.	
47.83	56.06		678.021	5.93	296.25	297.20	297.19	296.45	297.	
63.47	68.51		125.233	6.01	296.08	302.40	302.41	296.45	302.	
63.47	68.51		190.988	5.98	296.27	300.41	300.42	296.45	300.	
63.47	68.51		657.101	5.93	296.45	297.65	297.67	296.45	298.	
78.01	68.51		102.389	6.01	296.08	303.81	303.93	296.15	304.	
78.01	68.51		156.231	5.98	296.27	301.33	301.45	296.15	301.	
78.01	68.51		510.250	5.93	296.45	298.00	298.12	296.15	298.	
88.36	80.97		107.377	6.06	296.22	304.92	305.04	296.65	305.	
88.36	80.97		165.523	6.01	296.43	302.08	302.19	296.65	302.	
88.36	80.97		550.237	5.96	296.65	298.35	298.46	296.65	298.	
101.87	93.43		108.382	6.06	296.35	306.30	306.43	296.35	307.	
101.87	93.43		167.962	6.01	296.60	303.02	303.15	296.35	303.	
101.87	93.43		574.390	5.95	296.85	298.73	298.86	296.35	299.	
122.11	112.11		108.348	6.12	296.55	308.49	308.65	296.85	309.	
122.11	112.11		169.424	6.06	296.85	304.49	304.65	296.85	305.	
122.11	112.11		573.620	5.98	297.15	299.41	299.56	296.85	300.	
136.17	124.57		108.128	6.13	296.68	309.98	310.16	296.45	310.	
136.17	124.57		168.499	6.06	297.02	305.55	305.73	296.45	306.	
136.17	124.57		573.977	5.97	297.35	299.85	300.03	296.45	300.	
153.10	137.03		105.218	6.17	296.82	311.85	312.07	296.65	312.	
153.10	137.03		164.405	6.09	297.18	306.80	307.02	296.65	307.	
153.10	137.03		558.534	5.99	297.55	300.38	300.60	296.65	301.	
176.70	155.71		104.723	6.22	297.02	314.18	314.45	296.95	315.	
176.70	155.71		164.320	6.13	297.43	308.37	308.64	296.95	309.	
176.70	155.71		561.819	6.02	297.85	301.05	301.32	296.95	302.	
196.10	168.17		102.543	6.24	297.15	316.08	316.41	296.65	317.	
196.10	168.17		160.984	6.14	297.60	309.66	309.99	296.65	311.	
196.10	168.17		559.011	6.02	298.05	301.52	301.85	296.65	302.	
226.85	193.08		100.412	6.28	297.42	319.61	320.00	296.35	321.	
226.85	193.08		158.557	6.17	297.93	311.99	312.38	296.35	313.	
226.85	193.08		548.518	6.02	298.45	302.51	302.91	296.35	304.	
240.54	205.54		391.407	6.31	314.80	320.86	321.27	296.45	322.	
240.54	205.54		160.539	6.19	298.10	312.88	313.29	296.45	314.	
240.54	205.54		566.342	6.03	298.65	302.84	303.25	296.45	304.	
264.73	224.22		305.301	6.35	314.80	323.28	323.74	296.45	325.	
264.73	224.22		160.575	6.21	298.35	314.46	314.93	296.45	316.	
264.73	224.22		562.311	6.04	298.95	303.55	304.02	296.45	305.	
286.92	236.68		255.752	6.37	314.80	325.48	326.03	296.05	327.	
286.92	236.68		157.073	6.22	298.52	315.91	316.45	296.05	317.	
286.92	236.68		552.691	6.04	299.15	304.09	304.64	296.05	306.	
305.37	261.59		242.057	6.45	314.80	327.27	327.79	297.05	329.	
305.37	261.59		165.225	6.29	298.85	317.12	317.64	297.05	319.	
305.37	261.59		595.498	6.09	299.55	304.62	305.14	297.05	306.	
358.87	305.19		194.013	6.50	314.80	332.95	333.58	296.15	335.	
358.87	305.19		579.585	6.31	314.80	320.88	321.50	296.15	323.	
358.87	305.19		582.469	6.08	300.25	306.30	306.92	296.15	308.	

410.33	330.11	167.103	6.63	314.80	337.60	338.44	297.05	340.
410.33	330.11	422.449	6.41	314.80	323.82	324.65	297.05	326.
410.33	330.11	574.034	6.15	300.65	307.29	308.12	297.05	310.
495.60	411.08	148.172	6.74	314.80	346.82	347.75	295.85	350.
495.60	411.08	319.833	6.45	314.80	329.63	330.56	295.85	333.
495.60	411.08	600.667	6.14	301.95	309.85	310.78	295.85	313.
586.73	492.05	133.945	6.91	314.80	357.20	358.26	295.55	361.
586.73	492.05	273.593	6.55	314.80	335.56	336.62	295.55	339.
586.73	492.05	621.240	6.18	303.25	312.39	313.45	295.55	316.
685.93	566.79	121.608	7.13	314.80	368.59	369.89	295.85	373.
685.93	566.79	242.443	6.67	314.80	341.78	343.08	295.85	346.
685.93	566.79	623.022	6.24	304.45	314.95	316.25	295.85	319.


1000
800
600
400
200
0
Power (Watts)
0
50
100
150
200
Temperature (°C)
CIRCUMFERENTIAL AVERAGED SPIRAL FIN LARGE PITCH; R1011X
1.27cm TUBE; G = 210 Kg/m² s; .75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm


SPIRAL FIN LARGE PITCH; PHI = 0; H1011A
G = 210 kg/m²s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m² K)
1200
800
400
0
0
200
400
600
800
1000
Power (Watts)


SPIRAL FIN LARGE PITCH; PHI = PI/4; H10116
G = 210 kg/m² s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m² K)
1200
800
400
0
0
200
400
600
800
1000
Power (Watts)


1200
800
400
0
h (W/m² K)
0
200
400
600
800
1000
Power (Watts)
MEAN HEAT TRANSFER COEFFICIENTS
SPIRAL FIN LARGE PITCH; AVGH1011
G = 210 kg/m² s; 0.75 GPM; INLET TEMP = 22.2 C

H1011A.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-1949.238	-30.595	23.553	-2302.272
4.46	1254.771	142.089	93.389	112.613
17.65	6497.834	147.430	110.528	117.269
39.27	11470.130	154.292	117.793	122.644
69.52	-261500.100	160.130	121.676	125.228
107.89	-47580.690	161.749	124.511	127.635
163.27	-23125.610	162.683	124.383	128.349
184.27	-920123.100	161.800	494.992	529.472
207.36	-33727.950	164.227	379.042	396.646
233.14	-17345.540	163.269	307.943	326.290
267.21	-20241.870	532.907	256.653	267.618
295.48	-29690.140	435.131	233.011	242.339
343.47	-31537.610	348.763	205.380	211.568
396.07	-27814.830	308.995	191.015	188.236
513.95	-18659.710	253.047	165.195	160.755
653.42	-23137.380	227.104	156.391	150.206
771.59	-14428.290	206.185	151.306	143.028

H1011AA.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-23.018	15.624	-7.736
4.46	101.940	125.230	1239.613
17.65	106.311	133.516	459.558
39.27	112.142	136.497	485.862
69.52	114.565	141.296	487.220
107.89	114.623	140.844	481.702
163.27	115.260	139.242	482.573
184.27	343.566	138.936	476.569
207.36	284.197	448.689	471.062
233.14	244.841	356.608	479.190
267.21	209.857	284.992	473.529
295.48	195.324	253.757	475.487
343.47	173.569	219.840	475.704
396.07	164.701	202.357	476.069
513.95	141.425	174.478	475.640
653.42	126.375	161.367	1007.018
771.59	120.537	152.592	801.439

H1011B.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	7.795	11.711	23.553	5.185
4.46	1254.771	142.089	74.085	133.150
17.65	-5558.843	155.342	89.622	173.789
39.27	-4691.130	166.232	96.313	186.888
69.52	-2911.737	169.661	102.751	203.759
107.89	-3395.566	169.492	108.297	211.769
163.27	-3374.552	169.907	116.190	227.791
184.27	-3887.843	169.983	408.422	238.208
207.36	-3183.475	172.549	337.770	247.163
233.14	-2975.696	172.080	289.331	256.409
267.21	-3180.104	631.619	243.799	259.677
295.48	-3190.480	507.280	221.287	266.895
343.47	-3258.575	392.107	196.054	267.732
396.07	-3131.393	346.646	180.862	794.990
513.95	-2933.801	282.569	154.804	614.363
653.42	-3091.923	250.925	142.928	547.593
771.59	-2965.782	226.819	133.426	539.806

H1011BB.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-23.018	15.624	-7.736
4.46	331.537	388.251	1239.613
17.65	350.760	498.577	666.499
39.27	414.803	614.911	871.884
69.52	427.848	595.627	837.786
107.89	435.597	623.290	839.761
163.27	434.336	631.580	863.495
184.27	440.648	631.178	839.100
207.36	441.481	640.845	831.914
233.14	448.351	658.672	858.109
267.21	441.171	648.979	852.117
295.48	443.167	656.828	867.092
343.47	441.894	646.335	872.909
396.07	446.468	660.719	880.894
513.95	445.586	664.642	887.890
653.42	1055.567	698.126	914.083
771.59	772.673	2139.101	914.168

.00	9.356	7.789	0.000	6.351
4.46	1254.656	230.417	227.529	232.435
17.65	-7324.122	280.402	237.592	283.355
39.27	-3989.306	313.588	223.864	332.550
69.52	-3213.325	320.472	239.872	349.924
107.89	-3107.146	323.560	239.179	365.985
163.27	-3133.885	324.270	251.375	382.444
184.27	-3660.126	322.684	243.211	391.507
207.36	-2981.125	333.077	252.713	410.850
233.14	-2841.025	330.308	257.442	418.561
267.21	-3047.458	329.211	259.016	418.557
295.48	-3022.932	331.197	262.057	426.229
343.47	-3149.212	329.735	262.228	425.107
396.07	-3025.476	335.698	905.210	416.912
513.95	-3049.874	1179.854	455.388	432.443
653.42	-2909.129	769.636	374.708	1266.032
771.59	-2813.878	606.881	331.886	1017.495
.00	0.000	27.415	-12.870	
4.46	372.781	523.636	6851.141	
17.65	404.648	556.724	1345.887	
39.27	501.956	669.262	1785.938	
69.52	507.221	668.036	1778.651	
107.89	518.448	672.649	1751.774	
163.27	516.525	670.247	1794.977	
184.27	517.314	663.275	1703.488	
207.36	537.147	681.648	1771.899	
233.14	535.291	684.617	1786.335	
267.21	523.926	669.639	1745.892	
295.48	528.506	675.920	1787.339	
343.47	522.891	666.008	1769.043	
396.07	530.020	675.857	1814.491	
513.95	520.514	669.811	1811.768	
653.42	1484.673	685.028	1883.849	
771.59	1118.664	1782.437	1872.532	

← 211XX.DAT

SPIRAL FIN LARGE PITCH; G = 210 kg/m s; PHI = 0

R1011A.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	12.47	-330015.000		5.86	295.35	295.35	295.26	295.75	295.
.00	12.47	-5063.407		5.86	295.38	295.35	295.26	295.75	295.
.00	12.47	5194.681		5.86	295.42	295.45	295.36	295.75	295.
.00	12.47	-510023.200		5.86	295.45	295.45	295.36	295.75	295.
4.46	12.47	2813.997		5.87	295.45	295.51	295.46	295.85	295.
4.46	12.47	324.210		5.88	295.48	296.01	295.96	295.85	296.
4.46	12.47	215.315		5.88	295.52	296.31	296.26	295.85	296.
4.46	12.47	258.732		5.88	295.55	296.21	296.16	295.85	296.
17.65	18.71	5566.012		5.86	295.35	295.40	295.42	295.75	295.
17.65	18.71	128.490		5.89	295.40	297.40	297.42	295.75	297.
17.65	18.71	96.924		5.90	295.45	298.10	298.12	295.75	298.
17.65	18.71	102.745		5.90	295.50	298.00	298.02	295.75	298.
39.27	43.65	10313.640		5.88	295.35	295.41	295.44	295.95	295.
39.27	43.65	141.099		5.94	295.47	299.71	299.75	295.95	300.
39.27	43.65	108.320		5.96	295.58	301.12	301.15	295.95	301.
39.27	43.65	112.736		5.96	295.70	301.02	301.05	295.95	301.
69.52	62.37	-189553.000		5.87	295.35	295.35	295.51	295.75	295.
69.52	62.37	118.271		5.98	295.52	302.76	302.92	295.75	303.
69.52	62.37	90.353		6.02	295.68	305.16	305.32	295.75	305.
69.52	62.37	92.970		6.02	295.85	305.06	305.22	295.75	305.
107.89	93.55	-33397.430		5.89	295.35	295.31	295.59	296.15	296.
107.89	93.55	115.415		6.06	295.60	306.73	307.01	296.15	307.
107.89	93.55	89.294		6.12	295.85	310.23	310.51	296.15	311.
107.89	93.55	91.521		6.12	296.10	310.13	310.41	296.15	311.
163.27	137.20	-15740.570		5.90	295.45	295.33	295.78	296.25	296.
163.27	137.20	112.537		6.17	295.82	312.55	313.01	296.25	313.
163.27	137.20	86.488		6.25	296.18	317.96	318.41	296.25	319.
163.27	137.20	89.220		6.25	296.55	317.66	318.11	296.25	319.
184.27	155.91	-631843.300		5.96	295.45	295.45	295.95	297.35	297.
184.27	155.91	112.614		6.26	295.87	314.87	315.38	297.35	316.
184.27	155.91	346.303		6.35	314.80	320.98	321.49	297.35	322.
184.27	155.91	370.299		6.35	314.80	320.58	321.08	297.35	322.
207.36	168.39	-22167.310		5.96	295.45	295.35	295.96	297.45	297.
207.36	168.39	109.685		6.30	295.90	316.97	317.59	297.45	318.
207.36	168.39	254.476		6.41	314.80	323.88	324.50	297.45	325.
207.36	168.39	266.214		6.40	314.80	323.48	324.10	297.45	325.
233.14	180.86	-10893.940		5.94	295.35	295.12	295.88	296.95	297.
233.14	180.86	104.224		6.32	295.83	319.65	320.41	296.95	321.
233.14	180.86	197.595		6.44	314.80	327.37	328.12	296.95	329.
233.14	180.86	209.269		6.43	314.80	326.66	327.42	296.95	328.
267.21	205.80	-12624.760		5.94	295.35	295.13	296.00	296.85	297.
267.21	205.80	337.804		6.38	314.80	323.16	324.04	296.85	325.
267.21	205.80	163.541		6.52	314.80	332.08	332.95	296.85	334.
267.21	205.80	170.457		6.51	314.80	331.37	332.25	296.85	333.
295.48	236.99	-19291.400		5.92	295.35	295.18	296.08	296.35	297.
295.48	236.99	287.330		6.40	314.80	326.12	327.02	296.35	328.
295.48	236.99	154.658		6.56	314.80	335.84	336.74	296.35	338.
295.48	236.99	160.781		6.55	314.80	335.03	335.94	296.35	337.
343.47	268.17	-19955.670		5.90	295.45	295.27	296.36	295.65	298.
343.47	268.17	224.293		6.46	314.80	331.21	332.31	295.65	334.
343.47	268.17	132.766		6.64	314.80	342.53	343.63	295.65	345.
343.47	268.17	136.716		6.63	314.80	341.73	342.83	295.65	344.
396.07	305.59	-17396.060		5.89	295.35	295.11	296.40	295.25	298.
396.07	305.59	196.365		6.53	314.80	336.16	337.46	295.25	339.
396.07	305.59	122.017		6.74	314.80	349.18	350.47	295.25	352.
396.07	305.59	120.266		6.75	314.80	349.68	350.98	295.25	353.
513.95	399.14	-11742.600		5.93	295.35	294.88	296.54	296.05	299.

513.95	399.14	161.844	6.79	314.80	348.66	350.32	296.05	353.
513.95	399.14	106.231	7.10	314.80	366.38	368.04	296.05	370.
513.95	399.14	103.420	7.12	314.80	367.78	369.44	296.05	372.
653.42	492.69	-14137.920	5.96	295.45	294.97	297.19	296.25	300.
653.42	492.69	141.017	7.06	314.80	362.76	364.98	296.25	368.
653.42	492.69	97.610	7.44	314.80	384.09	386.31	296.25	389.
653.42	492.69	93.814	7.49	314.80	386.89	389.11	296.25	392.
771.59	586.24	-8882.605	5.99	295.45	294.54	297.13	296.55	301.
771.59	586.24	129.064	7.35	314.80	377.15	379.74	296.55	383.
771.59	586.24	95.144	7.76	314.80	399.38	401.97	296.55	405.
771.59	586.24	90.028	7.85	314.80	404.19	406.77	296.55	410.

_;PIRAL FIN LARGE PITCH; G = 210 kg/m s; PHI = 0
R1011AA.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	12.47		-5077.154	5.86	295.48	295.45	295.36	295.75	295.
.00	12.47		5170.742	5.86	295.52	295.55	295.46	295.75	295.
.00	12.47		-1706.282	5.86	295.55	295.45	295.36	295.75	295.
4.46	12.47		235.030	5.88	295.58	296.31	296.26	295.85	296.
4.46	12.47		287.720	5.88	295.62	296.21	296.16	295.85	296.
4.46	12.47		2799.956	5.87	295.65	295.71	295.66	295.85	295.
17.65	18.71		93.392	5.91	295.55	298.30	298.32	295.75	298.
17.65	18.71		116.773	5.90	295.60	297.80	297.82	295.75	297.
17.65	18.71		396.691	5.88	295.65	296.30	296.32	295.75	296.
39.27	43.65		103.329	5.97	295.82	301.62	301.65	295.95	301.
39.27	43.65		125.320	5.96	295.93	300.72	300.75	295.95	301.
39.27	43.65		440.315	5.91	296.05	297.41	297.44	295.95	297.
69.52	62.37		85.246	6.03	296.02	306.06	306.23	295.75	306.
69.52	62.37		104.735	6.01	296.18	304.36	304.52	295.75	304.
69.52	62.37		356.670	5.92	296.35	298.75	298.92	295.75	299.
107.89	93.55		82.406	6.14	296.35	311.93	312.21	296.15	312.
107.89	93.55		100.876	6.10	296.60	309.33	309.61	296.15	310.
107.89	93.55		340.721	5.97	296.85	300.62	300.90	296.15	301.
163.27	137.20		80.330	6.29	296.92	320.36	320.82	296.25	321.
163.27	137.20		96.709	6.23	297.28	316.76	317.21	296.25	318.
163.27	137.20		330.923	6.02	297.65	303.34	303.80	296.25	304.
184.27	155.91		240.916	6.40	314.80	323.68	324.19	297.35	325.
184.27	155.91		97.086	6.33	297.53	319.58	320.08	297.35	321.
184.27	155.91		328.807	6.09	297.95	304.46	304.96	297.35	306.
207.36	168.39		191.234	6.45	314.80	326.89	327.51	297.45	328.
207.36	168.39		300.916	6.38	314.80	322.48	323.10	297.45	324.
207.36	168.39		311.947	6.12	298.15	305.56	306.18	297.45	307.
233.14	180.86		157.444	6.49	314.80	330.57	331.32	296.95	332.
233.14	180.86		228.559	6.42	314.80	325.66	326.42	296.95	327.
233.14	180.86		303.220	6.11	298.25	306.44	307.19	296.95	308.
267.21	205.80		134.021	6.58	314.80	335.88	336.76	296.85	338.
267.21	205.80		181.417	6.49	314.80	330.37	331.25	296.85	332.
267.21	205.80		297.562	6.14	298.65	308.14	309.02	296.85	310.
295.48	236.99		129.920	6.63	314.80	339.84	340.74	296.35	342.
295.48	236.99		168.275	6.53	314.80	334.13	335.03	296.35	336.
295.48	236.99		311.269	6.14	299.15	309.60	310.50	296.35	312.
343.47	268.17		112.460	6.73	314.80	347.54	348.63	295.65	350.
343.47	268.17		141.996	6.61	314.80	340.73	341.83	295.65	343.
343.47	268.17		303.270	6.15	299.75	311.89	312.99	295.65	314.
396.07	305.59		105.435	6.83	314.80	354.59	355.88	295.25	357.
396.07	305.59		129.165	6.71	314.80	347.28	348.57	295.25	350.
396.07	305.59		299.950	6.18	300.25	314.23	315.53	295.25	317.
513.95	399.14		91.184	7.25	314.80	374.89	376.55	296.05	379.
513.95	399.14		112.107	7.05	314.80	363.68	365.34	296.05	368.
513.95	399.14		301.575	6.32	301.75	319.92	321.58	296.05	324.
653.42	492.69		79.186	7.74	314.80	400.21	402.43	296.25	405.
653.42	492.69		100.665	7.41	314.80	381.99	384.20	296.25	387.
653.42	492.69		619.793	6.44	314.80	325.71	327.93	296.25	331.
771.59	586.24		76.128	8.17	314.80	420.51	423.10	296.55	427.
771.59	586.24		95.939	7.75	314.80	398.68	401.27	296.55	405.
771.59	586.24		497.000	6.56	314.80	330.99	333.58	296.55	337.

SPIRAL FIN LARGE PITCH; G = 210 kg/m s; PHI = PI/4
R1011B.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	12.47		1719.355	5.86	295.35	295.45	295.36	295.75	295.
.00	12.47		2582.990	5.86	295.38	295.45	295.36	295.75	295.
.00	12.47		5194.681	5.86	295.42	295.45	295.36	295.75	295.
.00	12.47		1715.674	5.86	295.45	295.55	295.46	295.75	295.
4.46	12.47		2813.997	5.87	295.45	295.51	295.46	295.85	295.
4.46	12.47		324.210	5.88	295.48	296.01	295.96	295.85	296.
4.46	12.47		172.004	5.88	295.52	296.51	296.46	295.85	296.
4.46	12.47		304.852	5.88	295.55	296.11	296.06	295.85	296.
17.65	18.71		-4757.383	5.86	295.35	295.30	295.32	295.75	295.
17.65	18.71		135.265	5.89	295.40	297.30	297.32	295.75	297.
17.65	18.71		79.010	5.91	295.45	298.70	298.72	295.75	298.
17.65	18.71		151.198	5.89	295.50	297.20	297.22	295.75	297.
39.27	43.65		-4214.891	5.87	295.35	295.21	295.24	295.95	295.
39.27	43.65		151.838	5.94	295.47	299.41	299.45	295.95	299.
39.27	43.65		88.992	5.98	295.58	302.32	302.35	295.95	302.
39.27	43.65		170.571	5.93	295.70	299.21	299.25	295.95	299.
69.52	62.37		-2113.761	5.86	295.35	294.94	295.11	295.75	295.
69.52	62.37		125.198	5.98	295.52	302.35	302.52	295.75	302.
69.52	62.37		76.594	6.04	295.68	306.86	307.03	295.75	307.
69.52	62.37		150.092	5.96	295.85	301.55	301.72	295.75	302.
107.89	93.55		-2382.020	5.88	295.35	294.81	295.09	296.15	295.
107.89	93.55		120.853	6.06	295.60	306.23	306.51	296.15	307.
107.89	93.55		77.904	6.15	295.85	312.33	312.61	296.15	313.
107.89	93.55		150.651	6.03	296.10	304.62	304.90	296.15	305.
163.27	137.20		-2295.232	5.89	295.45	294.63	295.08	296.25	296.
163.27	137.20		117.456	6.16	295.82	311.85	312.31	296.25	313.
163.27	137.20		80.908	6.27	296.18	319.46	319.92	296.25	320.
163.27	137.20		156.977	6.10	296.55	308.55	309.00	296.25	309.
184.27	155.91		-2660.645	5.95	295.45	294.65	295.15	297.35	296.
184.27	155.91		118.219	6.24	295.87	313.97	314.48	297.35	315.
184.27	155.91		286.054	6.37	314.80	322.28	322.79	297.35	323.
184.27	155.91		165.069	6.18	296.70	309.67	310.17	297.35	311.
207.36	168.39		-2090.806	5.95	295.45	294.34	294.96	297.45	296.
207.36	168.39		115.156	6.28	295.90	315.97	316.59	297.45	317.
207.36	168.39		226.955	6.42	314.80	324.99	325.60	297.45	326.
207.36	168.39		164.323	6.20	296.80	310.87	311.48	297.45	312.
233.14	180.86		-1867.676	5.93	295.35	294.02	294.78	296.95	296.
233.14	180.86		109.760	6.30	295.83	318.45	319.21	296.95	320.
233.14	180.86		185.753	6.46	314.80	328.17	328.92	296.95	330.
233.14	180.86		162.853	6.20	296.80	312.04	312.80	296.95	314.
267.21	205.80		-1982.129	5.92	295.35	293.92	294.80	296.85	296.
267.21	205.80		400.073	6.35	314.80	321.86	322.74	296.85	324.
267.21	205.80		155.432	6.53	314.80	332.98	333.85	296.85	335.
267.21	205.80		163.756	6.23	297.00	314.25	315.13	296.85	316.
295.48	236.99		-2071.514	5.90	295.35	293.78	294.68	296.35	296.
295.48	236.99		334.689	6.38	314.80	324.52	325.42	296.35	327.
295.48	236.99		146.962	6.58	314.80	336.94	337.84	296.35	339.
295.48	236.99		175.286	6.24	297.25	315.81	316.71	296.35	318.
343.47	268.17		-2060.572	5.88	295.45	293.66	294.76	295.65	296.
343.47	268.17		251.961	6.43	314.80	329.41	330.51	295.65	332.
343.47	268.17		126.813	6.67	314.80	343.83	344.93	295.65	346.
343.47	268.17		171.239	6.27	297.60	319.10	320.20	295.65	322.
396.07	305.59		-1956.945	5.86	295.35	293.21	294.50	295.25	296.
396.07	305.59		220.092	6.49	314.80	333.86	335.15	295.25	337.
396.07	305.59		115.619	6.78	314.80	351.08	352.38	295.25	354.
396.07	305.59		502.635	6.32	314.80	323.15	324.44	295.25	326.
513.95	399.14		-1844.925	5.90	295.35	292.38	294.04	296.05	296.

513.95	399.14	180.533	6.73	314.80	345.15	346.81	296.05	349.
513.95	399.14	99.653	7.16	314.80	369.78	371.44	296.05	374.
513.95	399.14	390.578	6.46	314.80	328.83	330.49	296.05	333.
653.42	492.69	-1887.914	5.92	295.45	291.87	294.08	296.25	297.
653.42	492.69	155.640	6.98	314.80	358.26	360.47	296.25	363.
653.42	492.69	89.347	7.56	314.80	390.50	392.71	296.25	396.
653.42	492.69	337.758	6.59	314.80	334.82	337.04	296.25	340.
771.59	586.24	-1824.607	5.93	295.45	291.04	293.62	296.55	297.
771.59	586.24	141.817	7.25	314.80	371.55	374.13	296.55	378.
771.59	586.24	84.093	7.97	314.80	410.50	413.08	296.55	417.
771.59	586.24	335.279	6.69	314.80	338.80	341.39	296.55	345.

_SPIRAL FIN LARGE PITCH; G =210 kg/m s; PHI = PI/4
R1011BB.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	12.47		-5077.154	5.86	295.48	295.45	295.36	295.75	295.
.00	12.47		5170.742	5.86	295.52	295.55	295.46	295.75	295.
.00	12.47		-1706.282	5.86	295.55	295.45	295.36	295.75	295.
4.46	12.47		751.253	5.87	295.58	295.81	295.76	295.85	295.
4.46	12.47		879.760	5.87	295.62	295.81	295.76	295.85	295.
4.46	12.47		2799.956	5.87	295.65	295.71	295.66	295.85	295.
17.65	18.71		303.032	5.88	295.55	296.40	296.42	295.75	296.
17.65	18.71		429.992	5.88	295.60	296.20	296.22	295.75	296.
17.65	18.71		574.301	5.87	295.65	296.10	296.12	295.75	296.
39.27	43.65		375.917	5.91	295.82	297.41	297.44	295.95	297.
39.27	43.65		556.389	5.90	295.93	297.01	297.04	295.95	297.
39.27	43.65		788.293	5.90	296.05	296.81	296.84	295.95	297.
69.52	62.37		313.206	5.92	296.02	298.75	298.92	295.75	299.
69.52	62.37		435.450	5.91	296.18	298.15	298.31	295.75	298.
69.52	62.37		611.941	5.91	296.35	297.75	297.91	295.75	298.
107.89	93.55		308.065	5.97	296.35	300.52	300.80	296.15	301.
107.89	93.55		440.180	5.96	296.60	299.52	299.80	296.15	300.
107.89	93.55		592.637	5.95	296.85	299.02	299.30	296.15	299.
163.27	137.20		297.816	6.02	296.92	303.24	303.69	296.25	304.
163.27	137.20		432.410	6.00	297.28	301.64	302.09	296.25	303.
163.27	137.20		590.746	5.99	297.65	300.84	301.29	296.25	302.
184.27	155.91		303.947	6.09	297.12	304.16	304.66	297.35	305.
184.27	155.91		434.752	6.06	297.53	302.46	302.96	297.35	304.
184.27	155.91		577.582	6.05	297.95	301.65	302.16	297.35	303.
207.36	168.39		292.271	6.11	297.25	305.16	305.78	297.45	306.
207.36	168.39		423.624	6.08	297.70	303.16	303.77	297.45	304.
207.36	168.39		549.603	6.07	298.15	302.36	302.97	297.45	304.
233.14	180.86		283.631	6.11	297.28	306.04	306.79	296.95	308.
233.14	180.86		416.049	6.07	297.77	303.73	304.49	296.95	305.
233.14	180.86		541.701	6.06	298.25	302.83	303.59	296.95	304.
267.21	205.80		277.165	6.13	297.55	307.74	308.62	296.85	310.
267.21	205.80		407.085	6.09	298.10	305.04	305.91	296.85	307.
267.21	205.80		534.169	6.08	298.65	303.94	304.81	296.85	306.
295.48	236.99		290.035	6.14	297.88	309.10	310.00	296.35	311.
295.48	236.99		429.195	6.09	298.52	306.10	307.00	296.35	308.
295.48	236.99		566.237	6.07	299.15	304.89	305.80	296.35	307.
343.47	268.17		281.652	6.15	298.32	311.39	312.49	295.65	314.
343.47	268.17		411.329	6.09	299.03	307.98	309.08	295.65	310.
343.47	268.17		555.123	6.07	299.75	306.38	307.48	295.65	309.
396.07	305.59		281.223	6.17	298.62	313.53	314.83	295.25	316.
396.07	305.59		415.528	6.11	299.43	309.53	310.82	295.25	312.
396.07	305.59		553.630	6.08	300.25	307.83	309.12	295.25	311.
513.95	399.14		282.443	6.31	299.62	319.02	320.68	296.05	323.
513.95	399.14		420.626	6.22	300.68	313.71	315.37	296.05	318.
513.95	399.14		561.540	6.19	301.75	311.51	313.17	296.05	315.
653.42	492.69		649.596	6.43	314.80	325.21	327.43	296.25	330.
653.42	492.69		428.874	6.32	302.03	317.80	320.02	296.25	323.
653.42	492.69		561.224	6.28	303.35	315.40	317.61	296.25	321.
771.59	586.24		479.219	6.57	314.80	331.59	334.18	296.55	338.
771.59	586.24		1323.849	6.39	314.80	320.88	323.46	296.55	327.
771.59	586.24		565.556	6.37	304.85	319.08	321.66	296.55	325.

CIRCUMFERENTIAL SPIRAL FIN LARGE PITCH; G = 210 kg/m s; H1011X

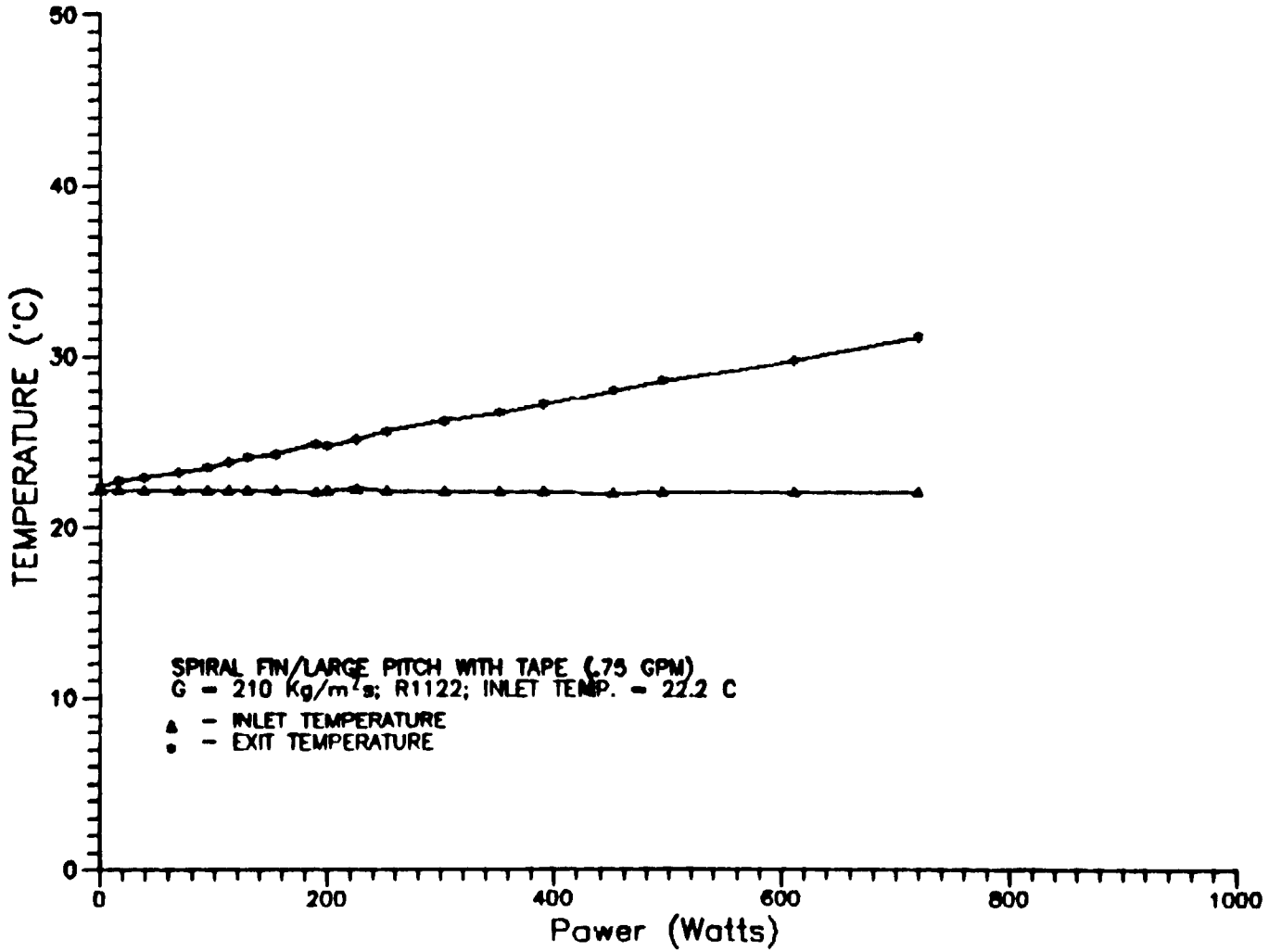
H1011X.TER

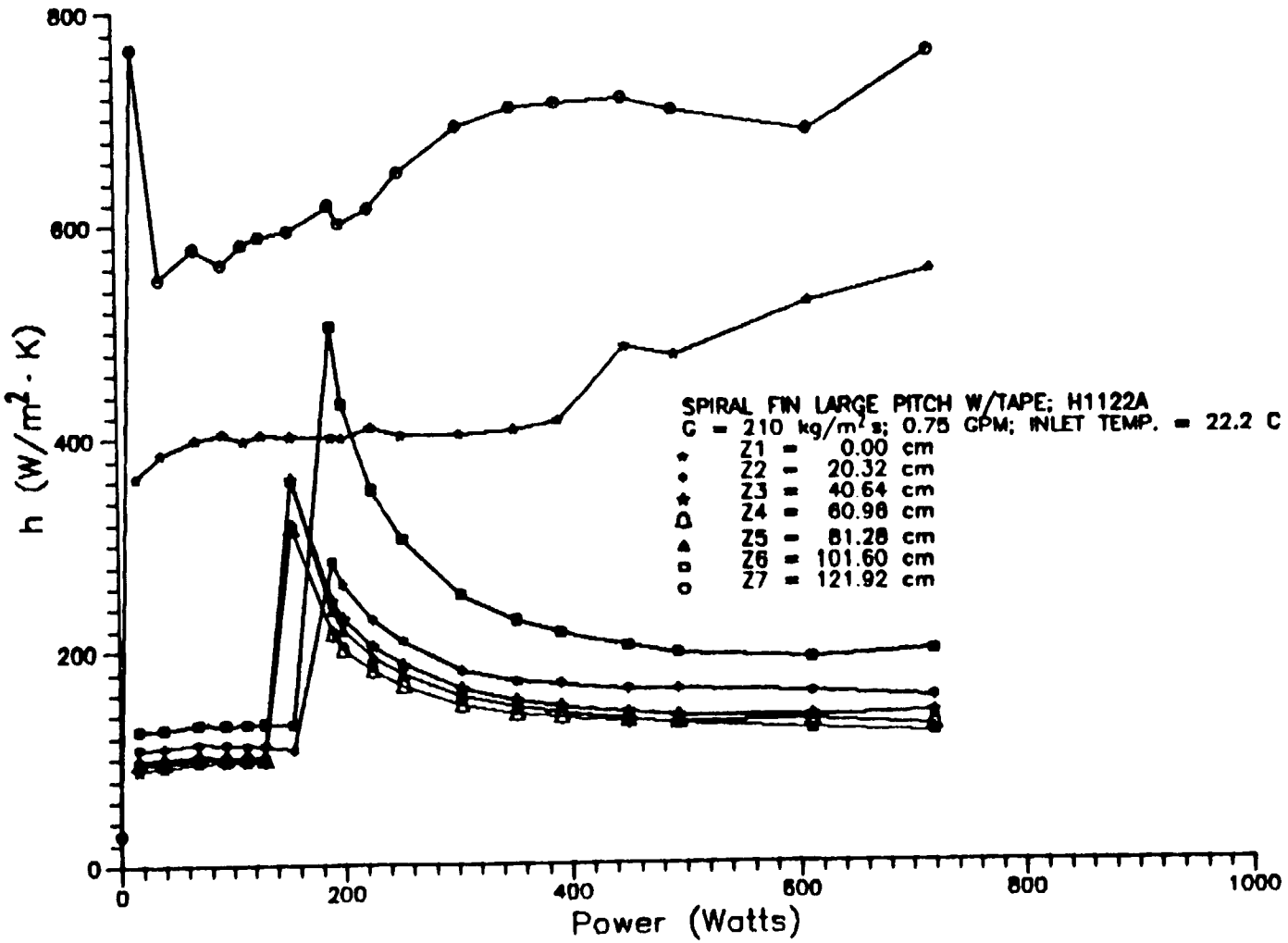
A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	12.47		1978.228	5.86	295.35	295.44	295.35	295.75	295.
.00	12.47		1874.459	5.86	295.38	295.47	295.39	295.75	295.
.00	12.47		-4065.402	5.86	295.42	295.37	295.29	295.75	295.
.00	12.47		1972.663	5.86	295.45	295.54	295.45	295.75	295.
4.46	12.47		2813.997	5.87	295.45	295.51	295.46	295.85	295.
4.46	12.47		522.158	5.87	295.48	295.81	295.76	295.85	295.
4.46	12.47		516.297	5.87	295.52	295.85	295.80	295.85	295.
4.46	12.47		527.856	5.87	295.55	295.87	295.83	295.85	295.
17.65	18.71		-6266.426	5.86	295.35	295.31	295.33	295.75	295.
17.65	18.71		242.384	5.88	295.40	296.46	296.48	295.75	296.
17.65	18.71		205.801	5.88	295.45	296.70	296.72	295.75	296.
17.65	18.71		245.123	5.88	295.50	296.55	296.57	295.75	296.
39.27	43.65		-3584.080	5.87	295.35	295.18	295.22	295.95	295.
39.27	43.65		284.370	5.91	295.47	297.57	297.61	295.95	297.
39.27	43.65		203.764	5.92	295.58	298.52	298.56	295.95	298.
39.27	43.65		301.697	5.91	295.70	297.69	297.72	295.95	298.
69.52	62.37		-2332.960	5.86	295.35	294.98	295.15	295.75	295.
69.52	62.37		234.815	5.93	295.52	299.16	299.33	295.75	299.
69.52	62.37		176.295	5.95	295.68	300.54	300.70	295.75	301.
69.52	62.37		256.410	5.93	295.85	299.19	299.35	295.75	299.
107.89	93.55		-2179.560	5.88	295.35	294.76	295.04	296.15	295.
107.89	93.55		229.056	5.98	295.60	301.21	301.49	296.15	302.
107.89	93.55		169.854	6.01	295.85	303.41	303.69	296.15	304.
107.89	93.55		259.033	5.98	296.10	301.06	301.34	296.15	301.
163.27	137.20		-2131.468	5.89	295.45	294.57	295.02	296.25	295.
163.27	137.20		222.564	6.04	295.82	304.28	304.73	296.25	305.
163.27	137.20		172.988	6.08	296.18	307.07	307.52	296.25	308.
163.27	137.20		262.356	6.03	296.55	303.73	304.18	296.25	305.
184.27	155.91		-2504.718	5.95	295.45	294.60	295.10	297.35	296.
184.27	155.91		222.824	6.11	295.87	305.47	305.98	297.35	307.
184.27	155.91		168.441	6.16	296.28	308.99	309.49	297.35	310.
184.27	155.91		270.156	6.10	296.70	304.62	305.13	297.35	306.
207.36	168.39		-1957.760	5.95	295.45	294.27	294.89	297.45	296.
207.36	168.39		220.704	6.13	295.90	306.37	306.99	297.45	308.
207.36	168.39		167.920	6.19	296.35	310.12	310.73	297.45	311.
207.36	168.39		272.020	6.12	296.80	305.30	305.91	297.45	307.
233.14	180.86		-1783.066	5.92	295.35	293.96	294.71	296.95	295.
233.14	180.86		209.186	6.13	295.83	307.70	308.46	296.95	309.
233.14	180.86		163.451	6.19	296.32	311.51	312.26	296.95	313.
233.14	180.86		264.810	6.11	296.80	306.17	306.93	296.95	308.
267.21	205.80		-1899.373	5.92	295.35	293.86	294.74	296.85	296.
267.21	205.80		207.041	6.16	295.90	309.55	310.42	296.85	311.
267.21	205.80		163.292	6.23	296.45	313.75	314.63	296.85	316.
267.21	205.80		262.958	6.13	297.00	307.74	308.62	296.85	310.
295.48	236.99		-1962.632	5.90	295.35	293.69	294.59	296.35	296.
295.48	236.99		216.967	6.16	295.98	310.98	311.88	296.35	313.
295.48	236.99		172.082	6.24	296.62	315.52	316.42	296.35	318.
295.48	236.99		278.923	6.13	297.25	308.91	309.81	296.35	311.
343.47	268.17		-1991.351	5.88	295.45	293.60	294.70	295.65	296.
343.47	268.17		210.380	6.18	296.17	313.66	314.76	295.65	316.
343.47	268.17		167.699	6.26	296.88	318.83	319.93	295.65	321.
343.47	268.17		270.929	6.14	297.60	311.19	312.29	295.65	314.
396.07	305.59		-1890.704	5.86	295.35	293.13	294.42	295.25	296.
396.07	305.59		211.653	6.21	296.17	315.99	317.28	295.25	319.
396.07	305.59		572.095	6.30	314.80	322.13	323.43	295.25	325.
396.07	305.59		262.630	6.17	297.80	313.77	315.07	295.25	317.
513.95	399.14		-1917.964	5.90	295.35	292.49	294.15	296.05	296.

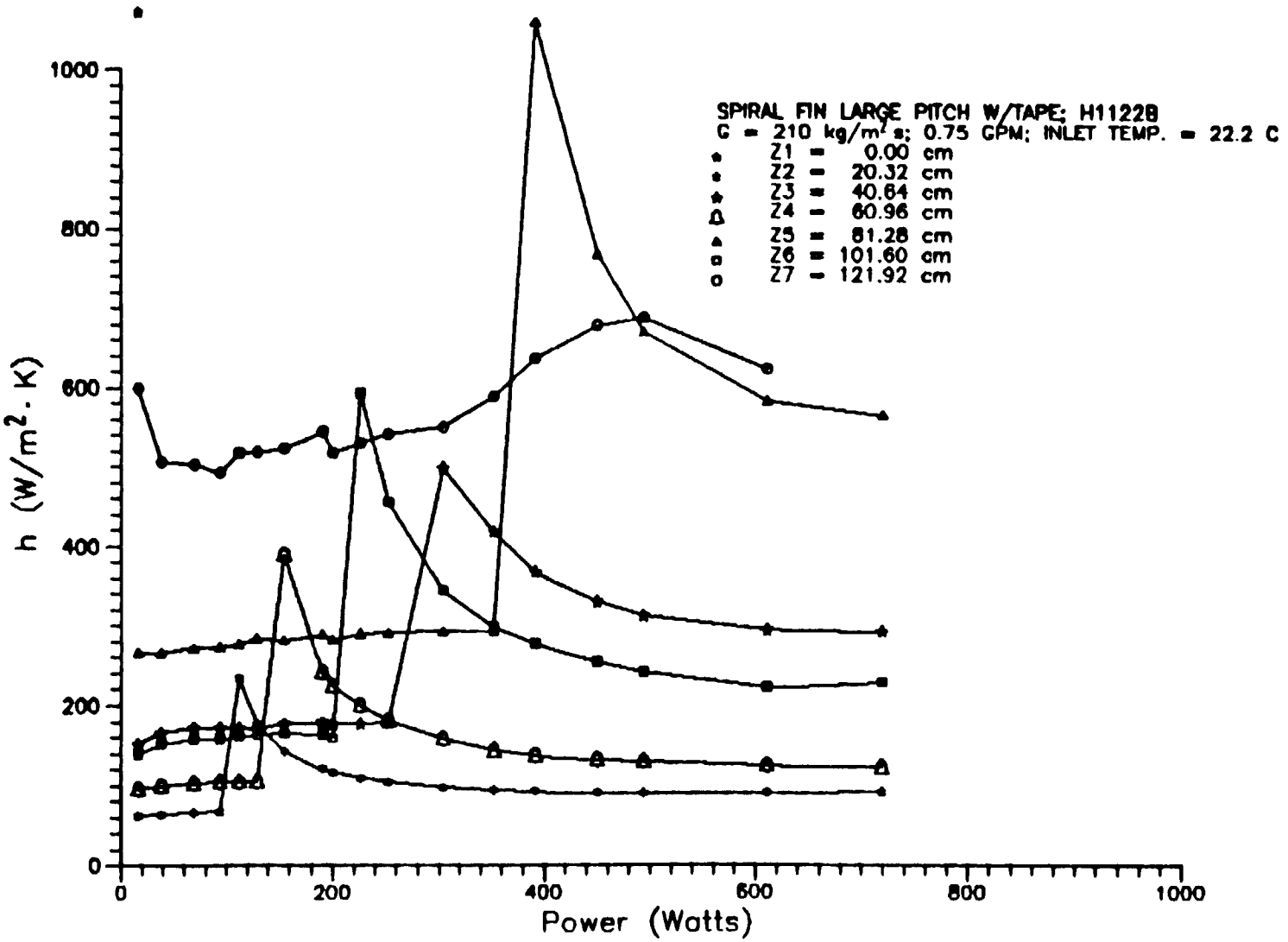
513.95	399.14	748.573	6.36	314.80	322.12	323.78	296.05	326.
513.95	399.14	289.938	6.54	314.80	333.70	335.36	296.05	338.
513.95	399.14	274.073	6.30	298.55	318.54	320.20	296.05	322.
653.42	492.69	-1776.205	5.91	295.45	291.64	293.86	296.25	297.
653.42	492.69	474.066	6.50	314.80	329.07	331.28	296.25	334.
653.42	492.69	231.627	6.74	314.80	344.00	346.21	296.25	349.
653.42	492.69	778.797	6.41	314.80	323.48	325.70	296.25	329.
771.59	586.24	-1731.075	5.93	295.45	290.80	293.38	296.55	297.
771.59	586.24	376.739	6.64	314.80	336.16	338.75	296.55	342.
771.59	586.24	206.760	6.94	314.80	353.72	356.31	296.55	360.
771.59	586.24	630.550	6.50	314.80	327.56	330.15	296.55	334.

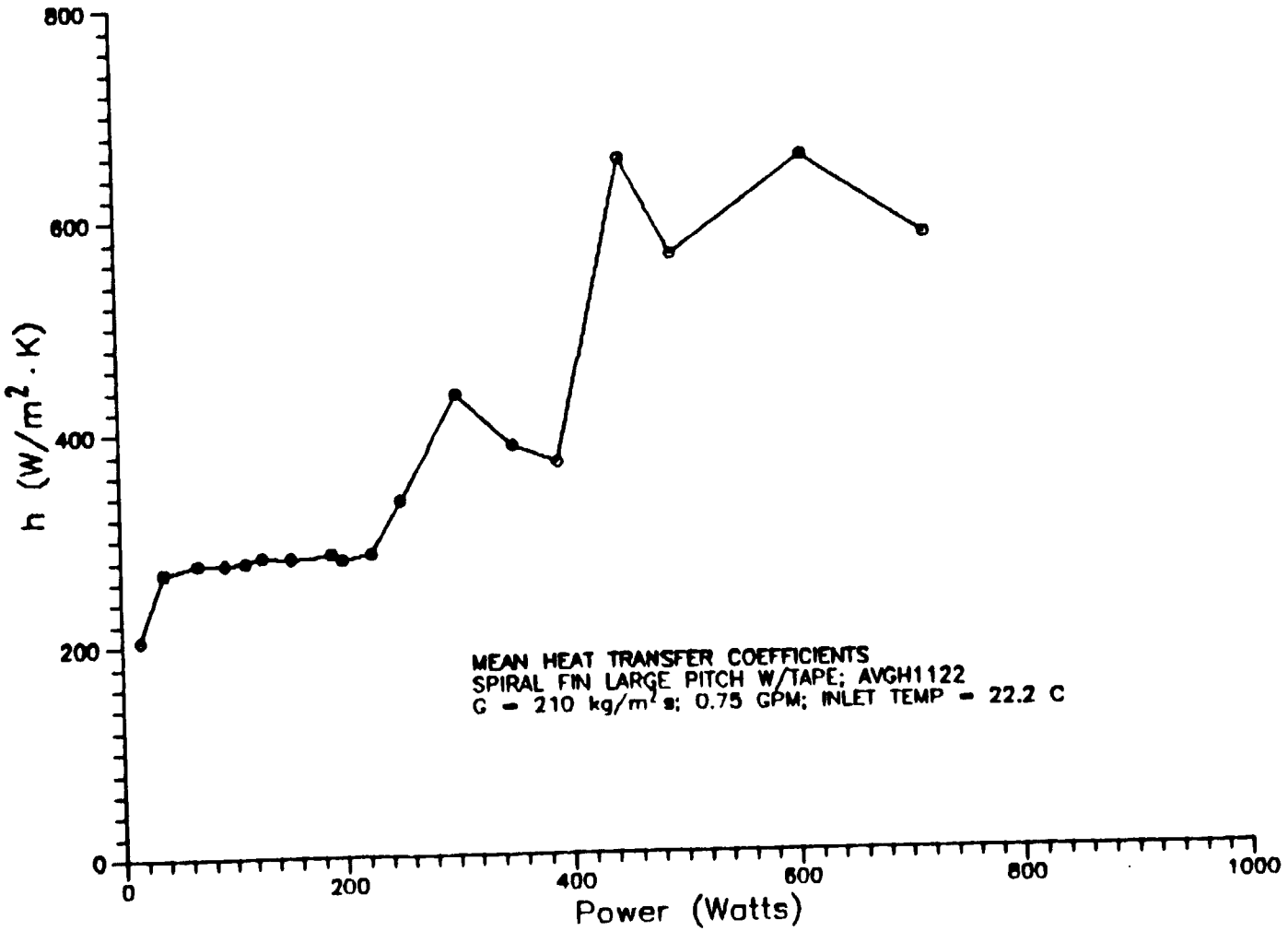
CIRCUMFERENTIAL SPIRAL FIN LARGE PITCH; G = 210 kg/m s; H1011XX
R1011XX.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	12.47		-8274.712	5.86	295.48	295.46	295.37	295.75	295.
.00	12.47		8513.285	5.86	295.52	295.54	295.45	295.75	295.
.00	12.47		-3406.348	5.86	295.55	295.50	295.41	295.75	295.
4.46	12.47		844.030	5.87	295.58	295.79	295.74	295.85	295.
4.46	12.47		1184.528	5.87	295.62	295.76	295.71	295.85	295.
4.46	12.47		15457.610	5.87	295.65	295.66	295.61	295.85	295.
17.65	18.71		349.247	5.88	295.55	296.29	296.31	295.75	296.
17.65	18.71		479.889	5.88	295.60	296.14	296.16	295.75	296.
17.65	18.71		1157.449	5.87	295.65	295.87	295.89	295.75	296.
39.27	43.65		454.406	5.90	295.82	297.14	297.17	295.95	297.
39.27	43.65		605.357	5.90	295.93	296.92	296.96	295.95	297.
39.27	43.65		1612.248	5.89	296.05	296.42	296.46	295.95	296.
69.52	62.37		370.960	5.91	296.02	298.32	298.49	295.75	298.
69.52	62.37		488.156	5.91	296.18	297.94	298.10	295.75	298.
69.52	62.37		1297.048	5.89	296.35	297.01	297.18	295.75	297.
107.89	93.55		366.315	5.96	296.35	299.86	300.14	296.15	300.
107.89	93.55		474.893	5.95	296.60	299.30	299.58	296.15	300.
107.89	93.55		1234.293	5.93	296.85	297.89	298.17	296.15	298.
163.27	137.20		353.839	6.01	296.92	302.24	302.69	296.25	303.
163.27	137.20		458.777	6.00	297.28	301.39	301.84	296.25	302.
163.27	137.20		1226.112	5.96	297.65	299.19	299.64	296.25	300.
184.27	155.91		356.522	6.07	297.12	303.12	303.62	297.35	304.
184.27	155.91		456.772	6.06	297.53	302.22	302.72	297.35	303.
184.27	155.91		1170.744	6.02	297.95	299.78	300.28	297.35	301.
207.36	168.39		355.235	6.09	297.25	303.76	304.37	297.45	305.
207.36	168.39		450.489	6.08	297.70	302.83	303.45	297.45	304.
207.36	168.39		1168.681	6.04	298.15	300.13	300.75	297.45	301.
233.14	180.86		338.314	6.09	297.28	304.62	305.38	296.95	306.
233.14	180.86		432.374	6.07	297.77	303.51	304.26	296.95	305.
233.14	180.86		1125.910	6.02	298.25	300.45	301.21	296.95	302.
267.21	205.80		328.852	6.11	297.55	306.14	307.02	296.85	308.
267.21	205.80		419.995	6.09	298.10	304.83	305.70	296.85	307.
267.21	205.80		1092.758	6.03	298.65	301.23	302.11	296.85	303.
295.48	236.99		345.561	6.11	297.88	307.30	308.20	296.35	309.
295.48	236.99		441.623	6.09	298.52	305.88	306.78	296.35	308.
295.48	236.99		1165.392	6.03	299.15	301.94	302.84	296.35	304.
343.47	268.17		332.976	6.11	298.32	309.37	310.47	295.65	312.
343.47	268.17		423.800	6.09	299.03	307.72	308.82	295.65	310.
343.47	268.17		1123.329	6.02	299.75	303.03	304.13	295.65	306.
396.07	305.59		333.547	6.13	298.62	311.19	312.49	295.25	314.
396.07	305.59		425.010	6.10	299.43	309.30	310.60	295.25	312.
396.07	305.59		1138.661	6.02	300.25	303.93	305.23	295.25	307.
513.95	399.14		329.663	6.26	299.62	316.24	317.90	296.05	320.
513.95	399.14		423.884	6.22	300.68	313.61	315.27	296.05	318.
513.95	399.14		1144.142	6.11	301.75	306.54	308.20	296.05	310.
653.42	492.69		913.018	6.39	314.80	322.21	324.42	296.25	327.
653.42	492.69		420.857	6.32	302.03	318.10	320.32	296.25	323.
653.42	492.69		1154.952	6.18	303.35	309.20	311.42	296.25	314.
771.59	586.24		693.086	6.48	314.80	326.41	329.00	296.55	333.
771.59	586.24		1103.380	6.41	314.80	322.09	324.68	296.55	328.
771.59	586.24		1156.776	6.25	304.85	311.80	314.39	296.55	318.


TEMPERATURE (°C)
50
40
30
20
10
0
0
200
400
600
800
1000
Power (Watts)
SPIRAL FIN/LARGE PITCH WITH TAPE (.75 GPM)
G = 210 Kg/m²s; R1122; INLET TEMP. = 22.2 C
▲ - INLET TEMPERATURE
● - EXIT TEMPERATURE


SPIRAL FIN LARGE PITCH W/TAPE; H1122A
G = 210 kg/m² s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m² · K)
Power (Watts)
0
200
400
600
800
1000


SPIRAL FIN LARGE PITCH W/TAPE: H1122B
G = 210 kg/m² s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m².K)
Power (Watts)
0
200
400
600
800
1000


800
600
400
200
0
h (W/m^2.K)
0
200
400
600
800
1000
Power (Watts)
MEAN HEAT TRANSFER COEFFICIENTS
SPIRAL FIN LARGE PITCH W/TAPE; AVGH1122
G = 210 kg/m^2 s; 0.75 GPM; INLET TEMP = 22.2 C

H1122A.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-1949.238	-41.749	-22.996	-16.661
16.30	362.827	109.224	89.834	95.786
38.17	385.778	109.960	92.072	96.622
68.85	399.679	113.653	96.492	100.542
93.44	404.646	113.156	97.178	99.832
111.90	398.102	112.434	97.580	100.077
129.12	403.625	111.970	97.792	98.762
154.60	402.068	108.057	361.777	316.420
190.04	401.391	284.098	247.767	216.528
199.77	400.863	262.513	230.868	202.119
225.66	409.972	229.416	205.084	181.688
252.23	402.864	209.167	187.214	167.303
303.89	402.990	180.726	164.464	148.570
352.72	407.354	170.627	153.676	140.783
391.59	416.226	168.522	148.100	137.789
449.88	484.716	163.054	141.543	133.732
493.89	476.617	162.654	137.760	132.062
610.89	527.047	159.278	137.623	133.715
719.09	555.822	154.661	140.182	128.427

H1122AA.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-19.964	-88.725	28.885
16.30	98.715	126.198	766.014
38.17	99.985	127.011	550.018
68.85	102.995	131.768	578.876
93.44	101.939	131.256	563.737
111.90	102.123	131.537	582.587
129.12	101.711	132.031	589.552
154.60	361.777	131.801	595.348
190.04	238.230	505.124	619.057
199.77	219.930	432.502	602.137
225.66	194.220	351.792	616.518
252.23	177.474	305.098	649.988
303.89	157.620	252.449	692.891
352.72	146.952	228.114	710.086
391.59	141.803	216.477	714.567
449.88	135.226	203.823	719.338
493.89	130.548	196.829	707.721
610.89	124.757	191.370	688.674
719.09	121.439	198.270	761.361

H1122B.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-1949.238	-41.749	-14.301	-16.661
16.30	1071.654	62.141	151.744	95.786
38.17	1760.171	63.791	166.131	99.762
68.85	1662.849	66.289	172.275	102.400
93.44	1601.305	67.205	172.106	103.973
111.90	1678.008	233.696	172.746	104.130
129.12	1706.987	177.451	170.031	104.745
154.60	1674.998	142.740	176.772	389.662
190.04	1733.290	120.756	178.535	241.956
199.77	1714.142	115.972	176.818	224.490
225.66	1777.795	108.991	177.332	200.597
252.23	1765.120	103.779	179.041	181.408
303.89	1674.574	97.027	499.000	158.127
352.72	1730.726	93.930	419.086	143.621
391.59	1835.288	92.875	368.923	138.090
449.88	2171.344	91.317	331.860	132.997
493.89	2076.588	90.695	314.105	130.122
610.89	2518.469	91.156	297.217	125.233
719.09	2662.804	92.027	294.438	122.854

H1122BB.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-19.964	-88.725	-1877.273
16.30	266.736	139.461	598.441
38.17	266.567	151.786	506.453
68.85	272.529	157.646	503.103
93.44	273.673	158.557	492.704
111.90	277.110	160.455	518.100
129.12	283.929	162.634	518.738
154.60	282.300	164.517	523.034
190.04	289.310	163.330	544.735
199.77	282.221	159.392	518.024
225.66	290.061	593.021	529.884
252.23	291.286	455.820	541.455
303.89	293.287	344.797	550.323
352.72	293.877	298.691	589.487
391.59	1060.662	278.332	638.044
449.88	769.964	255.304	680.335
493.89	672.323	243.597	689.999
610.89	585.516	224.364	625.481
719.09	567.225	229.928	1669.956

H1122X.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-52.850	-25.157	-15.697	-16.661
16.30	1023.908	136.621	242.204	186.859
38.17	1963.540	143.653	277.539	197.610
68.85	1898.986	148.946	286.667	204.559
93.44	1888.765	150.905	288.046	205.788
111.90	1936.030	150.736	289.372	206.390
129.12	2024.223	152.013	288.164	206.871
154.60	1995.721	152.023	296.393	201.993
190.04	2069.260	152.714	301.073	200.571
199.77	2039.163	152.483	297.876	198.941
225.66	2155.747	154.522	302.183	202.806
252.23	2116.756	519.792	305.238	204.173
303.89	2011.315	375.453	305.206	673.181
352.72	2078.801	322.529	311.358	494.455
391.59	2193.276	301.417	313.389	433.718
449.88	2727.330	278.339	1210.755	381.908
493.89	2594.198	266.787	960.258	354.693
610.89	3228.453	252.622	758.729	319.663
719.09	3485.341	244.853	687.980	297.384

H1122XX.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-21.420	-139.788	270.124
16.30	242.803	161.621	741.148
38.17	380.007	294.724	1274.737
68.85	387.737	304.423	1219.999
93.44	383.259	303.908	1176.990
111.90	386.414	306.955	1274.666
129.12	400.376	314.706	1313.645
154.60	394.492	314.165	1318.992
190.04	404.053	317.322	1458.761
199.77	391.182	306.476	1295.290
225.66	400.383	313.201	1322.681
252.23	408.344	319.403	1448.998
303.89	409.468	321.595	1458.820
352.72	409.989	324.132	1543.937
391.59	414.530	329.056	1697.765
449.88	418.147	938.499	1833.458
493.89	419.364	781.639	1828.033
610.89	1114.697	609.625	1631.037
719.09	924.855	581.671	1863.458

SPIRAL FIN LARGE PITCH W/TAPE; G = 210 kg/m s; PHI = 0
R1122A.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	12.47		130471.000	5.80	295.35	295.35	295.26	294.35	295.
.00	12.47		2512.429	5.80	295.38	295.45	295.36	294.35	295.
.00	12.47		1268.714	5.80	295.42	295.55	295.46	294.35	295.
.00	12.47		848.368	5.80	295.45	295.65	295.56	294.35	295.
16.30	31.18		564.169	5.88	295.35	296.11	296.03	295.85	296.
16.30	31.18		172.758	5.91	295.43	297.91	297.83	295.85	298.
16.30	31.18		142.909	5.91	295.52	298.51	298.43	295.85	298.
16.30	31.18		152.232	5.91	295.60	298.41	298.33	295.85	298.
38.17	43.65		358.939	5.91	295.35	297.02	297.04	296.15	297.
38.17	43.65		104.067	5.97	295.47	301.23	301.25	296.15	301.
38.17	43.65		87.568	5.99	295.58	302.43	302.45	296.15	302.
38.17	43.65		91.820	5.99	295.70	302.23	302.25	296.15	302.
68.85	62.37		294.764	5.94	295.35	298.25	298.41	296.25	298.
68.85	62.37		85.208	6.05	295.52	305.56	305.72	296.25	306.
68.85	62.37		72.655	6.08	295.68	307.47	307.63	296.25	308.
68.85	62.37		75.653	6.07	295.85	307.17	307.33	296.25	307.
93.44	81.07		285.958	5.96	295.35	299.24	299.48	296.35	300.
93.44	81.07		81.305	6.11	295.57	309.26	309.50	296.35	310.
93.44	81.07		70.106	6.15	295.78	311.66	311.90	296.35	312.
93.44	81.07		71.996	6.14	296.00	311.46	311.70	296.35	312.
111.90	99.78		289.395	5.96	295.35	300.08	300.35	295.95	301.
111.90	99.78		83.105	6.14	295.62	312.10	312.37	295.95	313.
111.90	99.78		72.400	6.18	295.88	314.80	315.07	295.95	315.
111.90	99.78		74.231	6.18	296.15	314.60	314.87	295.95	315.
129.12	118.49		302.072	5.95	295.35	300.73	301.02	295.65	301.
129.12	118.49		85.222	6.17	295.67	314.75	315.04	295.65	315.
129.12	118.49		74.704	6.22	295.98	317.76	318.05	295.65	318.
129.12	118.49		75.453	6.22	296.30	317.86	318.15	295.65	318.
154.60	130.97		278.038	5.93	295.35	301.82	302.24	294.75	303.
154.60	130.97		76.052	6.20	295.70	319.34	319.76	294.75	320.
154.60	130.97		255.274	6.24	314.80	321.84	322.27	294.75	323.
154.60	130.97		223.498	6.26	314.80	322.84	323.27	294.75	324.
190.04	174.62		301.123	5.94	295.25	303.21	303.63	294.35	304.
190.04	174.62		217.118	6.29	314.80	325.84	326.26	294.35	327.
190.04	174.62		189.604	6.32	314.80	327.44	327.87	294.35	329.
190.04	174.62		165.947	6.34	314.80	329.25	329.67	294.35	330.
199.77	162.15		265.712	5.94	295.35	303.73	304.32	294.05	305.
199.77	162.15		177.242	6.30	314.80	327.36	327.95	294.05	329.
199.77	162.15		156.085	6.33	314.80	329.06	329.66	294.05	330.
199.77	162.15		136.865	6.36	314.80	331.06	331.66	294.05	332.
225.66	180.86		268.302	5.95	295.45	304.70	305.39	293.95	306.
225.66	180.86		152.894	6.36	314.80	331.04	331.73	293.95	332.
225.66	180.86		136.859	6.39	314.80	332.94	333.63	293.95	334.
225.66	180.86		121.442	6.43	314.80	335.24	335.93	293.95	337.
252.23	218.28		284.706	5.96	295.35	305.87	306.53	293.75	308.
252.23	218.28		150.476	6.41	314.80	334.71	335.37	293.75	336.
252.23	218.28		134.877	6.45	314.80	337.02	337.67	293.75	339.
252.23	218.28		120.729	6.49	314.80	339.62	340.28	293.75	341.
303.89	255.70		276.851	6.00	295.35	308.03	308.87	293.75	310.
303.89	255.70		126.378	6.55	314.80	342.57	343.42	293.75	345.
303.89	255.70		115.168	6.59	314.80	345.28	346.12	293.75	347.
303.89	255.70		104.212	6.65	314.80	348.48	349.33	293.75	351.
352.72	286.88		270.522	6.01	295.35	309.91	310.96	293.25	312.
352.72	286.88		115.287	6.64	314.80	348.96	350.01	293.25	351.
352.72	286.88		104.007	6.70	314.80	352.66	353.71	293.25	355.
352.72	286.88		95.427	6.76	314.80	356.07	357.12	293.25	359.
391.59	318.06		275.968	6.04	295.35	311.17	312.34	293.35	314.

391.59	318.06	113.623	6.72	314.80	353.23	354.39	293.35	356.
391.59	318.06	100.064	6.81	314.80	358.43	359.60	293.35	361.
391.59	318.06	93.218	6.86	314.80	361.64	362.81	293.35	364.
449.88	374.19	328.931	5.98	295.25	310.87	312.15	291.95	314.
449.88	374.19	112.568	6.78	314.80	360.43	361.71	291.95	364.
449.88	374.19	97.952	6.90	314.80	367.24	368.52	291.95	371.
449.88	374.19	92.645	6.95	314.80	370.25	371.52	291.95	374.
493.89	405.37	319.150	6.03	295.35	312.79	314.23	292.15	317.
493.89	405.37	110.730	6.88	314.80	365.06	366.50	292.15	369.
493.89	405.37	94.051	7.03	314.80	373.97	375.41	292.15	378.
493.89	405.37	90.234	7.07	314.80	376.47	377.91	292.15	380.
610.89	480.21	337.687	6.12	295.35	314.87	316.80	293.05	320.
610.89	480.21	103.722	7.17	314.80	378.36	380.29	293.05	383.
610.89	480.21	89.849	7.35	314.80	388.17	390.10	293.05	393.
610.89	480.21	87.346	7.39	314.80	390.27	392.21	293.05	395.
719.09	567.52	357.582	6.07	295.35	317.14	319.40	290.95	323.
719.09	567.52	101.130	7.32	314.80	391.84	394.10	290.95	397.
719.09	567.52	91.821	7.47	314.80	399.65	401.91	290.95	405.
719.09	567.52	84.263	7.61	314.80	407.26	409.52	290.95	413.

SPIRAL FIN LARGE PITCH W/TAPE; G = 210 kg/m s; PHI = 0

R1122AA.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	12.47		1016.535	5.80	295.48	295.65	295.56	294.35	295.	
.00	12.47		4895.510	5.80	295.52	295.55	295.46	294.35	295.	
.00	12.47		-1738.536	5.80	295.55	295.45	295.36	294.35	295.	
16.30	31.18		156.887	5.91	295.68	298.41	298.33	295.85	298.	
16.30	31.18		199.606	5.91	295.77	297.91	297.83	295.85	298.	
16.30	31.18		1192.259	5.88	295.85	296.21	296.13	295.85	296.	
38.17	43.65		94.977	5.99	295.82	302.13	302.15	296.15	302.	
38.17	43.65		120.057	5.97	295.93	300.92	300.95	296.15	301.	
38.17	43.65		512.172	5.91	296.05	297.22	297.24	296.15	297.	
68.85	62.37		77.481	6.07	296.02	307.07	307.23	296.25	307.	
68.85	62.37		98.632	6.04	296.18	304.86	305.02	296.25	305.	
68.85	62.37		427.019	5.94	296.35	298.35	298.51	296.25	298.	
93.44	81.07		73.504	6.14	296.22	311.36	311.60	296.35	312.	
93.44	81.07		94.152	6.10	296.43	308.25	308.50	296.35	309.	
93.44	81.07		398.519	5.96	296.65	299.44	299.68	296.35	300.	
111.90	99.78		75.738	6.18	296.42	314.50	314.77	295.95	315.	
111.90	99.78		97.048	6.12	296.68	310.80	311.07	295.95	311.	
111.90	99.78		423.564	5.96	296.95	300.18	300.45	295.95	301.	
129.12	118.49		77.678	6.21	296.62	317.56	317.85	295.65	318.	
129.12	118.49		100.296	6.14	296.93	313.15	313.44	295.65	314.	
129.12	118.49		441.327	5.96	297.25	300.94	301.22	295.65	302.	
154.60	130.97		255.274	6.24	314.80	321.84	322.27	294.75	323.	
154.60	130.97		92.500	6.16	297.10	316.54	316.96	294.75	317.	
154.60	130.97		411.695	5.93	297.45	301.82	302.24	294.75	303.	
190.04	174.62		182.382	6.32	314.80	327.94	328.37	294.35	329.	
190.04	174.62		384.503	6.21	314.80	321.03	321.46	294.35	322.	
190.04	174.62		464.416	5.94	298.05	303.21	303.63	294.35	304.	
199.77	162.15		148.773	6.34	314.80	329.76	330.36	294.05	331.	
199.77	162.15		290.889	6.22	314.80	322.45	323.05	294.05	324.	
199.77	162.15		399.066	5.93	297.95	303.53	304.12	294.05	305.	
225.66	180.86		129.700	6.41	314.80	333.94	334.63	293.95	335.	
225.66	180.86		233.537	6.27	314.80	325.43	326.12	293.95	327.	
225.66	180.86		403.420	5.95	298.35	304.50	305.19	293.95	306.	
252.23	218.28		127.957	6.47	314.80	338.22	338.87	293.75	340.	
252.23	218.28		218.642	6.31	314.80	328.50	329.16	293.75	330.	
252.23	218.28		459.209	5.95	298.85	305.37	306.03	293.75	307.	
303.89	255.70		110.450	6.61	314.80	346.58	347.42	293.75	349.	
303.89	255.70		175.820	6.42	314.80	334.76	335.61	293.75	337.	
303.89	255.70		475.720	5.98	299.45	306.83	307.67	293.75	309.	
352.72	286.88		99.532	6.73	314.80	354.37	355.42	293.25	357.	
352.72	286.88		153.545	6.50	314.80	340.45	341.50	293.25	343.	
352.72	286.88		471.236	5.99	299.95	308.31	309.35	293.25	311.	
391.59	318.06		95.883	6.84	314.80	360.34	361.50	293.35	363.	
391.59	318.06		145.462	6.58	314.80	344.82	345.98	293.35	348.	
391.59	318.06		473.496	6.02	300.45	309.67	310.84	293.35	313.	
449.88	374.19		93.660	6.94	314.80	369.65	370.92	291.95	373.	
449.88	374.19		140.270	6.63	314.80	351.42	352.70	291.95	355.	
449.88	374.19		488.298	6.00	301.25	311.77	313.05	291.95	315.	
493.89	405.37		89.220	7.09	314.80	377.17	378.61	292.15	381.	
493.89	405.37		133.627	6.73	314.80	356.44	357.89	292.15	360.	
493.89	405.37		474.018	6.04	301.85	313.59	315.03	292.15	317.	
610.89	480.21		81.607	7.48	314.80	395.58	397.51	293.05	400.	
610.89	480.21		124.282	6.99	314.80	367.84	369.77	293.05	373.	
610.89	480.21		441.589	6.16	303.05	317.98	319.91	293.05	323.	
719.09	567.52		79.770	7.71	314.80	412.47	414.72	290.95	418.	
719.09	567.52		129.168	7.03	314.80	375.12	377.37	290.95	381.	
719.09	567.52		490.150	6.12	304.45	320.34	322.60	290.95	326.	

SPIRAL FIN LARGE PITCH W/TAPE; G = 210 kg/m s; PHI = PI/4
R1122B.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	12.47		130471.000	5.80	295.35	295.35	295.26	294.35	295.
.00	12.47		2512.429	5.80	295.38	295.45	295.36	294.35	295.
.00	12.47		728.226	5.80	295.42	295.65	295.56	294.35	295.
.00	12.47		848.368	5.80	295.45	295.65	295.56	294.35	295.
16.30	31.18		1658.617	5.87	295.35	295.61	295.53	295.85	295.
16.30	31.18		100.009	5.93	295.43	299.71	299.64	295.85	299.
16.30	31.18		238.642	5.90	295.52	297.31	297.23	295.85	297.
16.30	31.18		152.232	5.91	295.60	298.41	298.33	295.85	298.
38.17	43.65		1629.236	5.89	295.35	295.72	295.74	296.15	296.
38.17	43.65		61.377	6.03	295.47	305.23	305.26	296.15	305.
38.17	43.65		156.080	5.94	295.58	299.42	299.45	296.15	299.
38.17	43.65		94.726	5.98	295.70	302.03	302.05	296.15	302.
68.85	62.37		1220.369	5.90	295.35	296.05	296.21	296.25	296.
68.85	62.37		50.489	6.15	295.52	312.47	312.63	296.25	313.
68.85	62.37		128.226	6.00	295.68	302.36	302.52	296.25	302.
68.85	62.37		77.016	6.07	295.85	306.97	307.13	296.25	307.
93.44	81.07		1126.267	5.91	295.35	296.34	296.58	296.35	297.
93.44	81.07		49.028	6.25	295.57	318.27	318.51	296.35	319.
93.44	81.07		122.757	6.04	295.78	304.85	305.09	296.35	305.
93.44	81.07		74.907	6.14	296.00	310.86	311.10	296.35	311.
111.90	99.78		1213.809	5.90	295.35	296.48	296.75	295.95	297.
111.90	99.78		175.316	6.30	314.80	322.61	322.88	295.95	323.
111.90	99.78		126.726	6.06	295.88	306.69	306.96	295.95	307.
111.90	99.78		77.162	6.17	296.15	313.90	314.17	295.95	314.
129.12	118.49		1271.308	5.89	295.35	296.63	296.92	295.65	297.
129.12	118.49		137.045	6.36	314.80	326.67	326.96	295.65	327.
129.12	118.49		128.461	6.07	295.98	308.65	308.93	295.65	309.
129.12	118.49		79.907	6.20	296.30	316.66	316.94	295.65	317.
154.60	130.97		1152.681	5.86	295.35	296.91	297.33	294.75	298.
154.60	130.97		101.821	6.41	314.80	332.46	332.88	294.75	333.
154.60	130.97		123.324	6.07	296.05	310.63	311.05	294.75	311.
154.60	130.97		274.810	6.23	314.80	321.34	321.76	294.75	322.
190.04	174.62		1293.927	5.85	295.25	297.10	297.53	294.35	298.
190.04	174.62		93.419	6.53	314.80	340.46	340.88	294.35	342.
190.04	174.62		135.111	6.10	296.18	313.92	314.35	294.35	315.
190.04	174.62		185.204	6.32	314.80	327.74	328.17	294.35	329.
199.77	162.15		1130.632	5.84	295.35	297.32	297.91	294.05	299.
199.77	162.15		79.273	6.55	314.80	342.88	343.48	294.05	344.
199.77	162.15		118.236	6.11	296.22	315.04	315.64	294.05	316.
199.77	162.15		151.821	6.34	314.80	329.46	330.06	294.05	331.
225.66	180.86		1157.857	5.84	295.45	297.59	298.28	293.95	299.
225.66	180.86		73.538	6.65	314.80	348.56	349.25	293.95	350.
225.66	180.86		117.087	6.15	296.42	317.62	318.31	293.95	319.
225.66	180.86		133.903	6.40	314.80	333.34	334.03	293.95	335.
252.23	218.28		1241.273	5.84	295.35	297.76	298.42	293.75	299.
252.23	218.28		75.593	6.74	314.80	354.44	355.10	293.75	356.
252.23	218.28		127.631	6.18	296.52	319.99	320.65	293.75	322.
252.23	218.28		130.752	6.46	314.80	337.72	338.37	293.75	339.
303.89	255.70		1144.843	5.86	295.35	298.42	299.26	293.75	301.
303.89	255.70		68.683	6.94	314.80	365.91	366.75	293.75	368.
303.89	255.70		345.780	6.26	314.80	324.95	325.79	293.75	327.
303.89	255.70		110.799	6.61	314.80	346.48	347.32	293.75	349.
352.72	286.88		1143.821	5.85	295.35	298.79	299.84	293.25	301.
352.72	286.88		64.249	7.10	314.80	376.10	377.14	293.25	379.
352.72	286.88		280.639	6.31	314.80	328.83	329.88	293.25	331.
352.72	286.88		97.316	6.74	314.80	355.27	356.32	293.25	358.
391.59	318.06		1211.023	5.86	295.35	298.96	300.12	293.35	302.

391.59	318.06	63.400	7.25	314.80	383.67	384.84	293.35	386.
391.59	318.06	246.680	6.38	314.80	332.50	333.67	293.35	335.
391.59	318.06	93.418	6.86	314.80	361.54	362.71	293.35	364.
449.88	374.19	1467.405	5.80	295.25	298.75	300.03	291.95	302.
449.88	374.19	63.827	7.40	314.80	395.28	396.56	291.95	399.
449.88	374.19	227.272	6.40	314.80	337.40	338.68	291.95	341.
449.88	374.19	92.146	6.95	314.80	370.55	371.82	291.95	374.
493.89	405.37	1384.723	5.82	295.35	299.37	300.81	292.15	303.
493.89	405.37	62.521	7.57	314.80	403.81	405.25	292.15	407.
493.89	405.37	212.203	6.47	314.80	341.02	342.47	292.15	345.
493.89	405.37	88.934	7.09	314.80	377.37	378.81	292.15	381.
610.89	480.21	1607.379	5.88	295.35	299.45	301.38	293.05	304.
610.89	480.21	60.083	8.03	314.80	424.52	426.45	293.05	429.
610.89	480.21	192.095	6.67	314.80	349.12	351.05	293.05	354.
610.89	480.21	81.912	7.48	314.80	395.28	397.21	293.05	400.
719.09	567.52	1706.799	5.81	295.35	299.91	302.17	290.95	306.
719.09	567.52	60.863	8.30	314.80	442.81	445.07	290.95	448.
719.09	567.52	191.003	6.69	314.80	355.59	357.85	290.95	361.
719.09	567.52	80.680	7.69	314.80	411.36	413.62	290.95	417.

SPIRAL FIN LARGE PITCH W/TAPE; G = 210 kg/m s; PHI = PI/4
R1122BB.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	12.47		1016.535	5.80	295.48	295.65	295.56	294.35	295.
.00	12.47		4895.510	5.80	295.52	295.55	295.46	294.35	295.
.00	12.47		103893.600	5.80	295.55	295.55	295.46	294.35	295.
16.30	31.18		417.108	5.89	295.68	296.71	296.63	295.85	296.
16.30	31.18		220.161	5.90	295.77	297.71	297.63	295.85	297.
16.30	31.18		932.269	5.88	295.85	296.31	296.23	295.85	296.
38.17	43.65		249.225	5.93	295.82	298.22	298.25	296.15	298.
38.17	43.65		143.008	5.96	295.93	300.12	300.15	296.15	300.
38.17	43.65		471.787	5.91	296.05	297.32	297.34	296.15	297.
68.85	62.37		201.892	5.97	296.02	300.26	300.42	296.25	300.
68.85	62.37		117.630	6.01	296.18	303.46	303.62	296.25	304.
68.85	62.37		371.372	5.94	296.35	298.65	298.81	296.25	299.
93.44	81.07		194.264	6.00	296.22	301.95	302.19	296.35	302.
93.44	81.07		113.356	6.06	296.43	306.25	306.49	296.35	307.
93.44	81.07		348.532	5.97	296.65	299.84	300.08	296.35	300.
111.90	99.78		202.304	6.00	296.42	303.19	303.46	295.95	304.
111.90	99.78		117.972	6.08	296.68	308.29	308.56	295.95	309.
111.90	99.78		376.885	5.96	296.95	300.58	300.85	295.95	301.
129.12	118.49		213.383	6.01	296.62	304.24	304.53	295.65	305.
129.12	118.49		123.096	6.10	296.93	310.15	310.44	295.65	311.
129.12	118.49		388.548	5.96	297.25	301.44	301.72	295.65	302.
154.60	130.97		196.018	6.00	296.75	305.92	306.34	294.75	307.
154.60	130.97		115.017	6.10	297.10	312.73	313.15	294.75	314.
154.60	130.97		361.905	5.94	297.45	302.42	302.84	294.75	303.
190.04	174.62		217.906	6.02	297.12	308.12	308.54	294.35	309.
190.04	174.62		123.908	6.15	297.58	316.93	317.35	294.35	318.
190.04	174.62		408.893	5.95	298.05	303.91	304.34	294.35	305.
199.77	162.15		187.824	6.02	297.08	308.93	309.53	294.05	310.
199.77	162.15		106.859	6.16	297.52	318.35	318.94	294.05	320.
199.77	162.15		343.557	5.95	297.95	304.43	305.02	294.05	306.
225.66	180.86		190.570	6.04	297.38	310.41	311.10	293.95	312.
225.66	180.86		392.503	6.20	314.80	321.13	321.82	293.95	323.
225.66	180.86		346.969	5.96	298.35	305.50	306.19	293.95	307.
252.23	218.28		206.650	6.06	297.68	312.18	312.84	293.75	314.
252.23	218.28		325.741	6.24	314.80	324.00	324.66	293.75	326.
252.23	218.28		382.837	5.97	298.85	306.68	307.33	293.75	308.
303.89	255.70		202.246	6.12	298.08	315.44	316.28	293.75	318.
303.89	255.70		239.479	6.34	314.80	329.46	330.30	293.75	332.
303.89	255.70		378.201	6.01	299.45	308.73	309.57	293.75	311.
352.72	286.88		195.901	6.15	298.42	318.52	319.57	293.25	321.
352.72	286.88		200.514	6.40	314.80	334.44	335.49	293.25	337.
352.72	286.88		391.494	6.02	299.95	310.01	311.06	293.25	313.
391.59	318.06		705.977	6.20	314.80	320.98	322.15	293.35	324.
391.59	318.06		186.531	6.47	314.80	338.21	339.37	293.35	341.
391.59	318.06		422.973	6.04	300.45	310.77	311.94	293.35	314.
449.88	374.19		524.969	6.20	314.80	324.58	325.86	291.95	328.
449.88	374.19		175.252	6.51	314.80	344.11	345.39	291.95	347.
449.88	374.19		461.916	6.01	301.25	312.37	313.65	291.95	316.
493.89	405.37		452.220	6.25	314.80	327.11	328.55	292.15	331.
493.89	405.37		164.962	6.60	314.80	348.53	349.98	292.15	352.
493.89	405.37		462.192	6.04	301.85	313.89	315.33	292.15	318.
610.89	480.21		376.807	6.39	314.80	332.29	334.23	293.05	337.
610.89	480.21		145.420	6.85	314.80	360.13	362.06	293.05	365.
610.89	480.21		401.221	6.19	303.05	319.48	321.41	293.05	324.
719.09	567.52		366.406	6.37	314.80	336.06	338.32	290.95	342.
719.09	567.52		149.524	6.88	314.80	366.90	369.16	290.95	373.
719.09	567.52		1075.477	6.15	314.80	322.04	324.30	290.95	328.

CIRCUMFERENTIAL AVERAGED SPIRAL FIN LARGE PITCH W/TAPE; H1122X

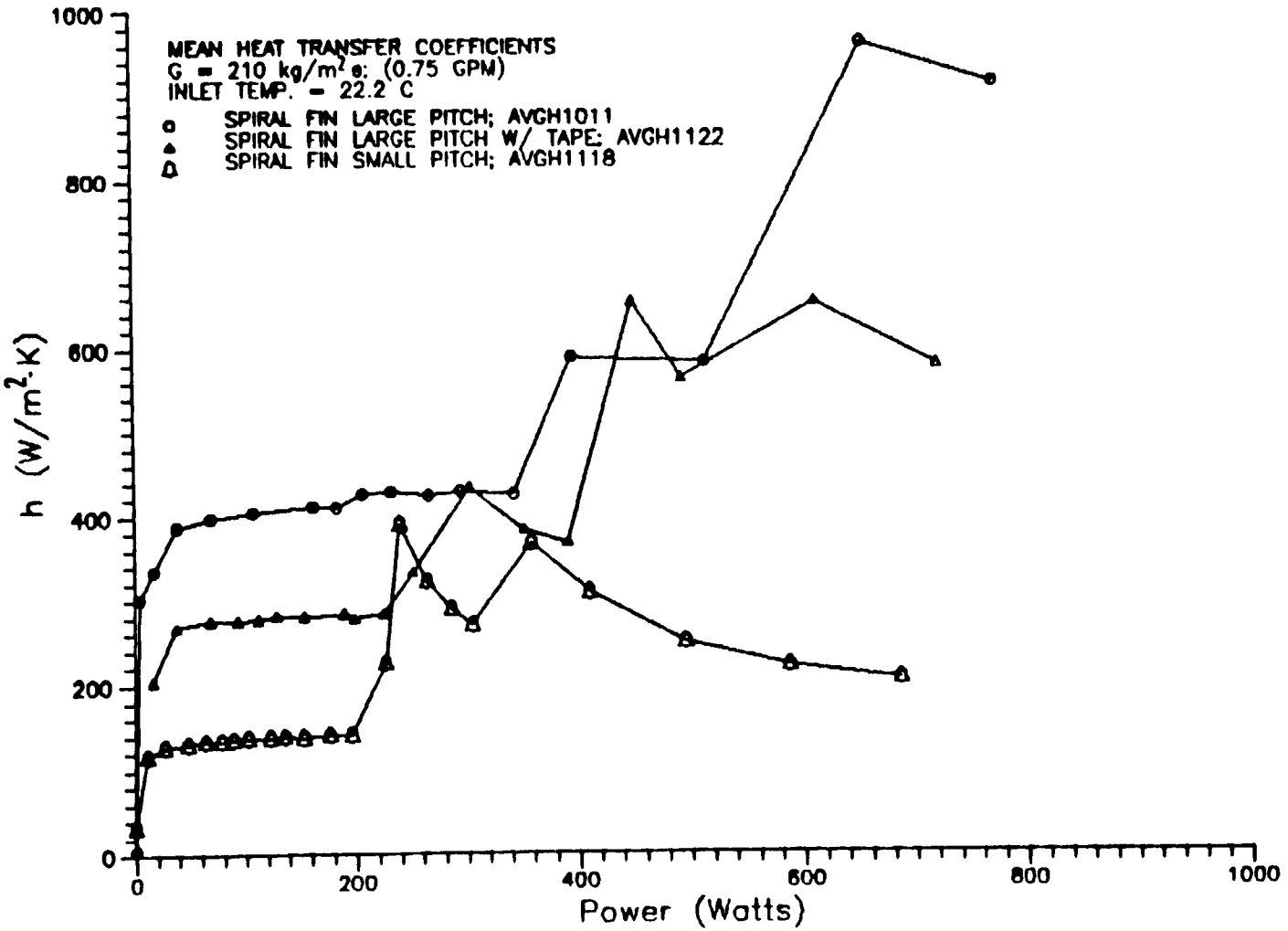
R1122X.TER

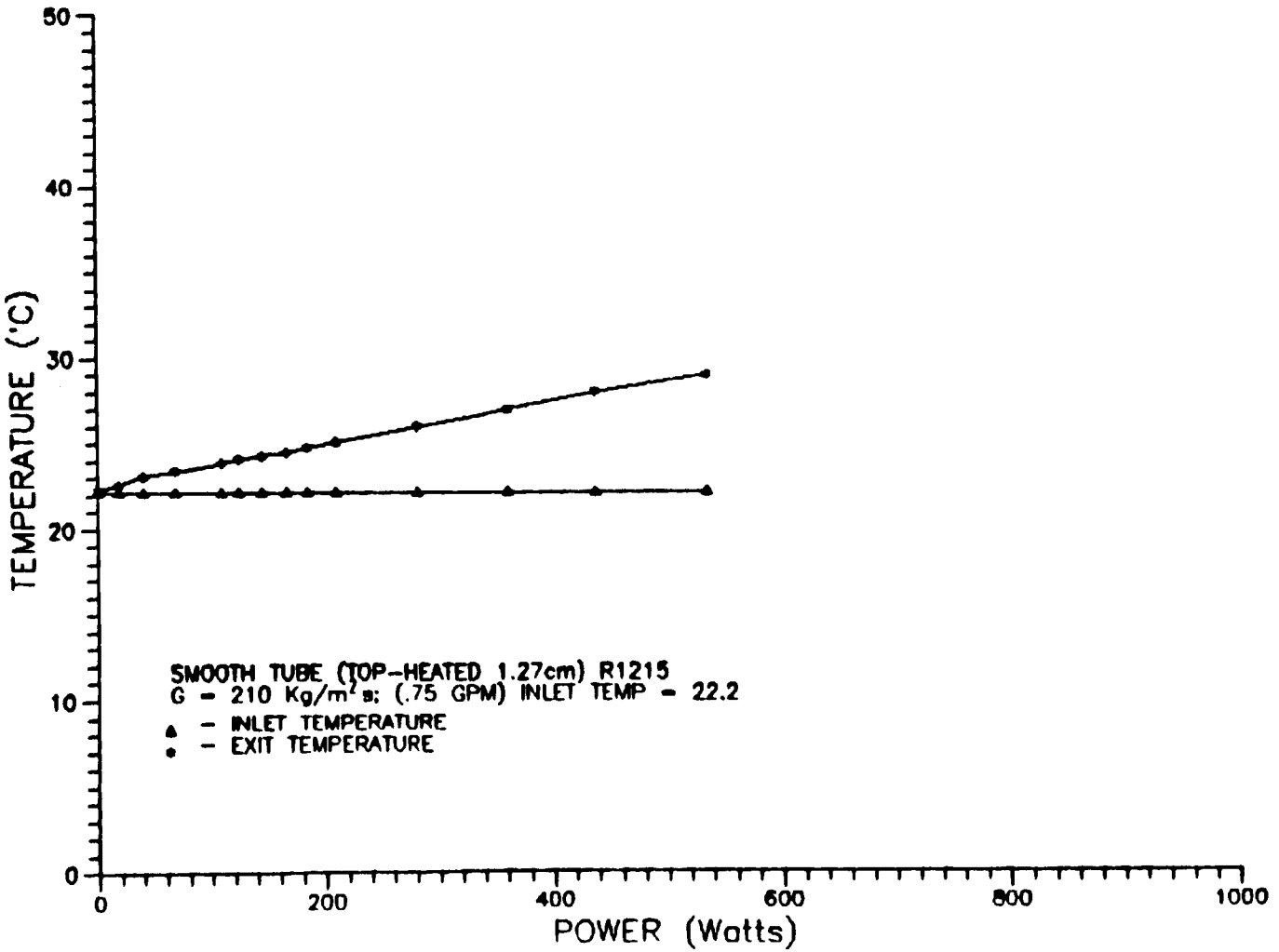
A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	12.47		3331.505	5.80	295.35	295.40	295.31	294.35	295.	
.00	12.47		1448.181	5.80	295.38	295.50	295.41	294.35	295.	
.00	12.47		815.089	5.80	295.42	295.63	295.54	294.35	295.	
.00	12.47		848.368	5.80	295.45	295.65	295.56	294.35	295.	
16.30	31.18		1584.784	5.87	295.35	295.62	295.54	295.85	295.	
16.30	31.18		215.087	5.90	295.43	297.42	297.35	295.85	297.	
16.30	31.18		378.513	5.89	295.52	296.65	296.57	295.85	296.	
16.30	31.18		293.168	5.89	295.60	297.06	296.98	295.85	297.	
38.17	43.65		1817.248	5.89	295.35	295.68	295.70	296.15	296.	
38.17	43.65		135.222	5.95	295.47	299.90	299.92	296.15	300.	
38.17	43.65		259.141	5.92	295.58	297.90	297.92	296.15	298.	
38.17	43.65		185.286	5.94	295.70	298.93	298.96	296.15	299.	
68.85	62.37		1393.426	5.90	295.35	295.96	296.12	296.25	296.	
68.85	62.37		111.078	6.01	295.52	303.22	303.38	296.25	303.	
68.85	62.37		212.111	5.96	295.68	299.72	299.88	296.25	300.	
68.85	62.37		151.957	5.98	295.85	301.48	301.64	296.25	302.	
93.44	81.07		1328.101	5.91	295.35	296.19	296.43	296.35	297.	
93.44	81.07		107.821	6.06	295.57	305.89	306.13	296.35	306.	
93.44	81.07		204.227	5.99	295.78	301.23	301.47	296.35	302.	
93.44	81.07		146.476	6.02	296.00	303.60	303.84	296.35	304.	
111.90	99.78		1400.133	5.90	295.35	296.33	296.60	295.95	297.	
111.90	99.78		110.777	6.08	295.62	307.98	308.25	295.95	308.	
111.90	99.78		211.019	5.99	295.88	302.37	302.65	295.95	303.	
111.90	99.78		151.097	6.03	296.15	305.22	305.49	295.95	306.	
129.12	118.49		1507.200	5.89	295.35	296.43	296.72	295.65	297.	
129.12	118.49		115.010	6.09	295.67	309.81	310.10	295.65	310.	
129.12	118.49		216.375	6.00	295.98	303.50	303.79	295.65	304.	
129.12	118.49		155.936	6.04	296.30	306.73	307.02	295.65	307.	
154.60	130.97		1373.057	5.86	295.35	296.66	297.08	294.75	298.	
154.60	130.97		106.270	6.10	295.70	312.62	313.04	294.75	313.	
154.60	130.97		205.572	5.98	296.05	304.80	305.22	294.75	306.	
154.60	130.97		140.714	6.04	296.40	309.18	309.60	294.75	310.	
190.04	174.62		1544.353	5.84	295.25	296.80	297.23	294.35	298.	
190.04	174.62		115.806	6.14	295.72	316.42	316.84	294.35	318.	
190.04	174.62		226.516	5.99	296.18	306.77	307.19	294.35	308.	
190.04	174.62		151.605	6.08	296.65	312.46	312.88	294.35	314.	
199.77	162.15		1344.702	5.84	295.35	297.01	297.60	294.05	298.	
199.77	162.15		102.165	6.15	295.78	317.57	318.17	294.05	319.	
199.77	162.15		198.017	5.99	296.22	307.46	308.05	294.05	309.	
199.77	162.15		132.860	6.08	296.65	313.40	314.00	294.05	315.	
225.66	180.86		1403.648	5.84	295.45	297.22	297.91	293.95	299.	
225.66	180.86		102.210	6.19	295.93	320.22	320.91	293.95	322.	
225.66	180.86		198.334	6.01	296.42	308.93	309.62	293.95	310.	
225.66	180.86		133.707	6.11	296.90	315.47	316.16	293.95	317.	
252.23	218.28		1488.200	5.83	295.35	297.36	298.02	293.75	299.	
252.23	218.28		371.199	6.22	314.80	322.87	323.53	293.75	325.	
252.23	218.28		216.307	6.03	296.52	310.37	311.03	293.75	312.	
252.23	218.28		145.342	6.14	297.10	317.72	318.37	293.75	319.	
303.89	255.70		1374.703	5.85	295.35	297.90	298.75	293.75	300.	
303.89	255.70		260.613	6.32	314.80	328.27	329.11	293.75	330.	
303.89	255.70		210.248	6.08	296.72	313.41	314.25	293.75	316.	
303.89	255.70		465.853	6.22	314.80	322.33	323.18	293.75	324.	
352.72	286.88		1373.512	5.84	295.35	298.22	299.27	293.25	301.	
352.72	286.88		216.378	6.38	314.80	333.00	334.05	293.25	336.	
352.72	286.88		207.313	6.11	296.88	315.88	316.93	293.25	318.	
352.72	286.88		330.798	6.28	314.80	326.71	327.75	293.25	329.	
391.59	318.06		1446.916	5.85	295.35	298.37	299.53	293.35	301.	

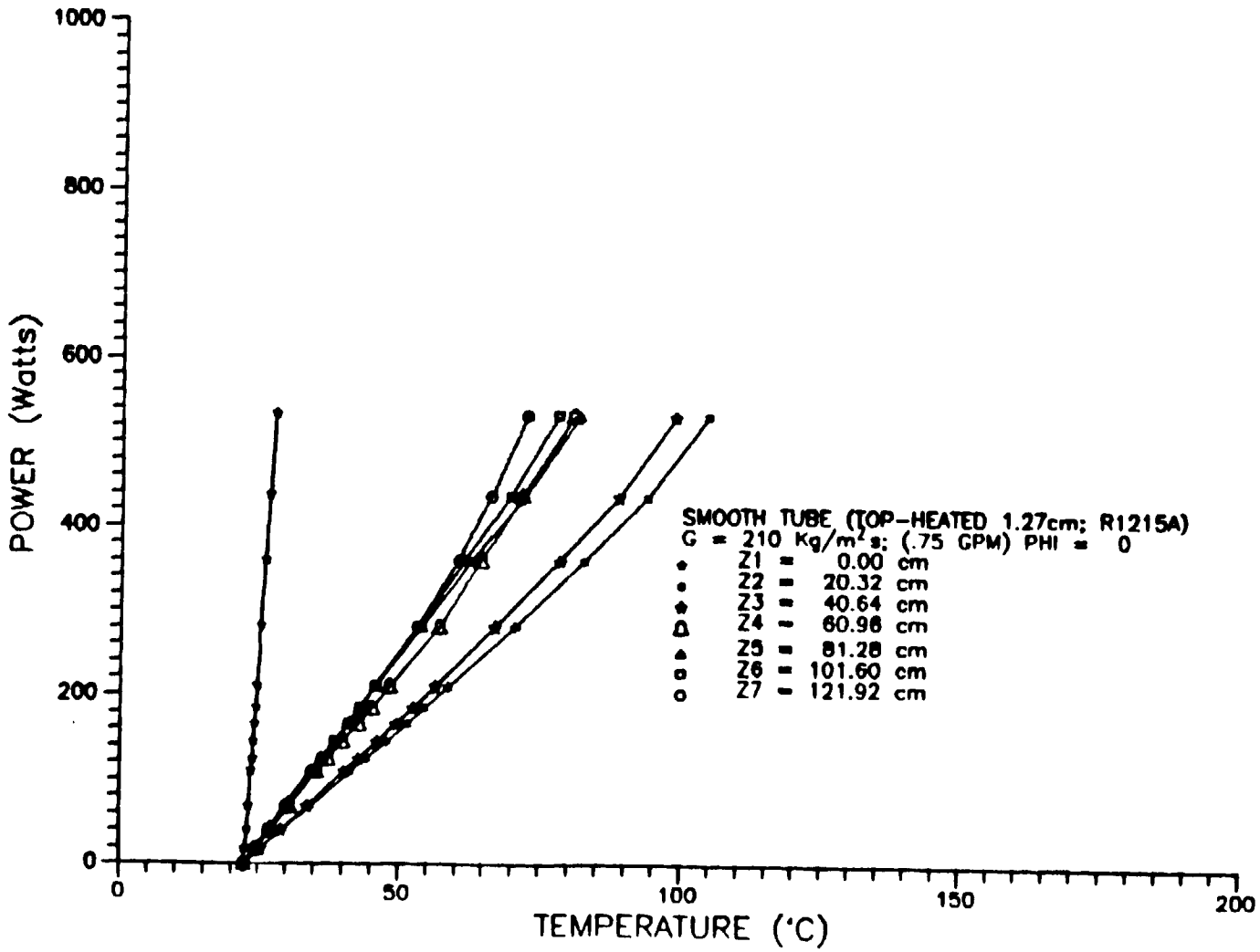
391.59	318.06	201.859	6.44	314.80	336.43	337.60	293.35	339.
391.59	318.06	208.346	6.15	297.05	318.01	319.17	293.35	321.
391.59	318.06	289.702	6.34	314.80	329.87	331.04	293.35	333.
449.88	374.19	1842.698	5.79	295.25	298.04	299.32	291.95	301.
449.88	374.19	190.904	6.47	314.80	341.71	342.99	291.95	345.
449.88	374.19	824.499	6.14	314.80	321.03	322.31	291.95	324.
449.88	374.19	261.280	6.35	314.80	334.46	335.74	291.95	338.
493.89	405.37	1729.452	5.81	295.35	298.57	300.01	292.15	302.
493.89	405.37	180.500	6.55	314.80	345.63	347.07	292.15	349.
493.89	405.37	645.146	6.19	314.80	323.43	324.87	292.15	327.
493.89	405.37	239.398	6.43	314.80	338.05	339.49	292.15	342.
610.89	480.21	2060.043	5.87	295.35	298.55	300.48	293.05	303.
610.89	480.21	163.524	6.77	314.80	355.11	357.05	293.05	360.
610.89	480.21	487.784	6.33	314.80	328.31	330.25	293.05	333.
610.89	480.21	206.476	6.63	314.80	346.73	348.66	293.05	351.
719.09	567.52	2233.502	5.79	295.35	298.84	301.10	290.95	305.
719.09	567.52	159.120	6.83	314.80	363.76	366.02	290.95	369.
719.09	567.52	444.053	6.31	314.80	332.34	334.60	290.95	338.
719.09	567.52	192.898	6.68	314.80	355.19	357.45	290.95	361.

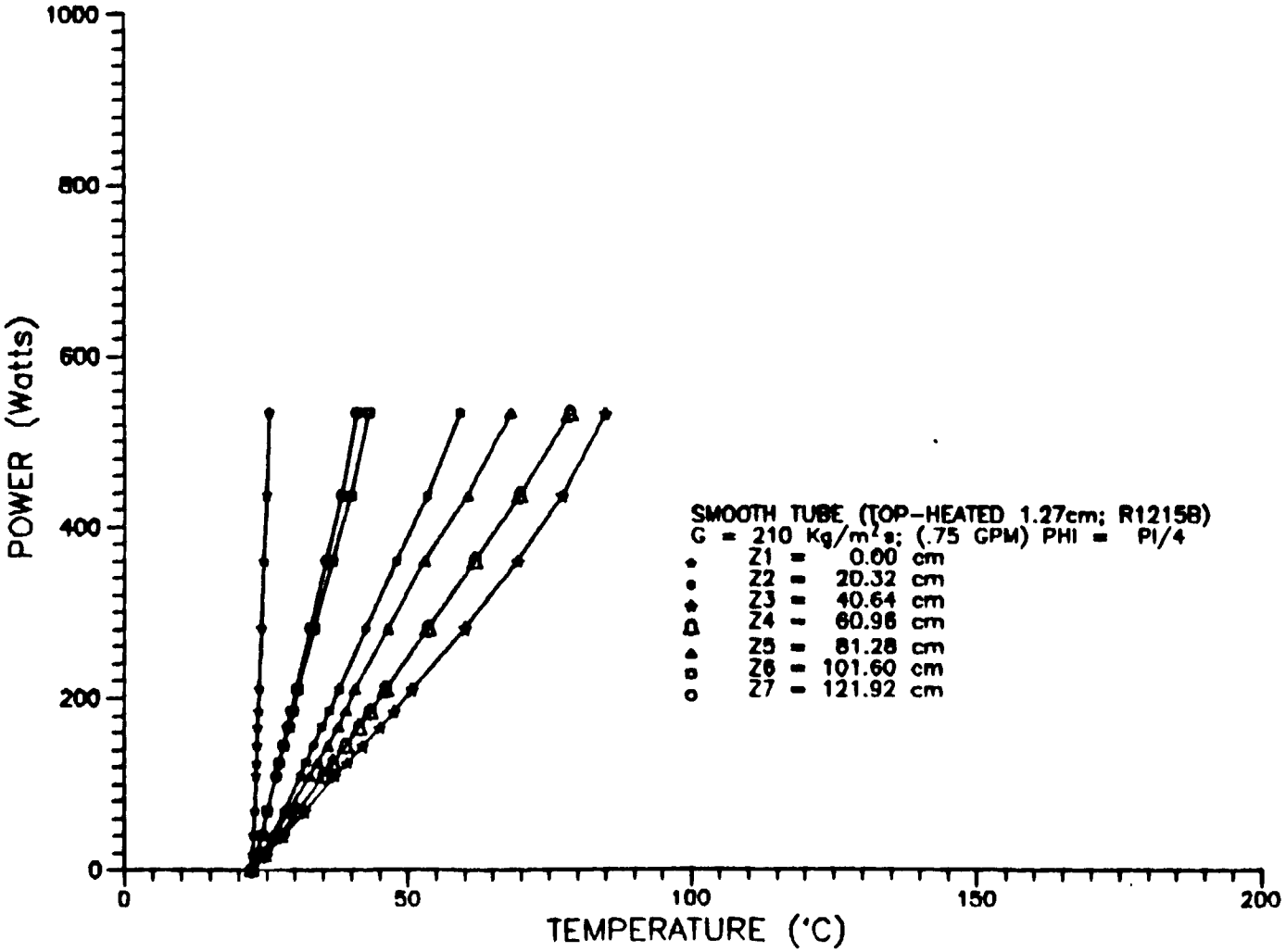
CIRCUMFERENTIAL AVERAGED SPIRAL FIN LARGE PITCH W/TAPE; H1122XX
R1122XX.TER

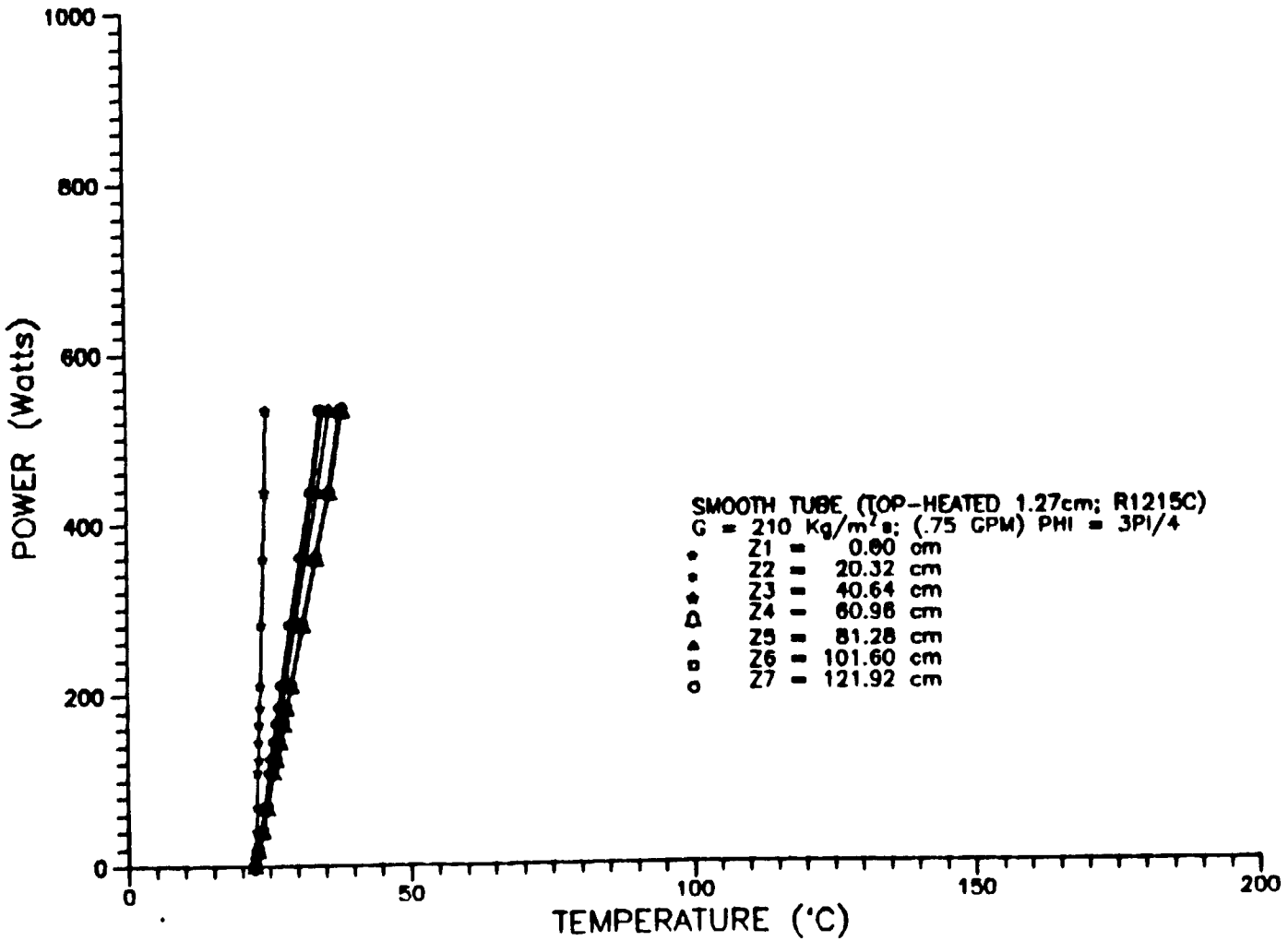
A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	12.47		1101.778	5.80	295.48	295.64	295.55	294.35	295.
.00	12.47		7792.021	5.80	295.52	295.54	295.45	294.35	295.
.00	12.47		-15081.330	5.80	295.55	295.54	295.45	294.35	295.
16.30	31.18		380.030	5.89	295.68	296.81	296.73	295.85	296.
16.30	31.18		254.507	5.90	295.77	297.45	297.37	295.85	297.
16.30	31.18		1153.625	5.88	295.85	296.22	296.14	295.85	296.
38.17	43.65		354.263	5.92	295.82	297.51	297.53	296.15	297.
38.17	43.65		275.424	5.93	295.93	298.11	298.13	296.15	298.
38.17	43.65		1183.818	5.90	296.05	296.56	296.58	296.15	296.
68.85	62.37		286.439	5.95	296.02	299.01	299.17	296.25	299.
68.85	62.37		225.381	5.96	296.18	299.98	300.14	296.25	300.
68.85	62.37		897.867	5.92	296.35	297.30	297.46	296.25	297.
93.44	81.07		271.325	5.97	296.22	300.32	300.56	296.35	301.
93.44	81.07		215.602	5.99	296.43	301.60	301.84	296.35	302.
93.44	81.07		830.063	5.94	296.65	297.99	298.23	296.35	298.
111.90	99.78		281.362	5.97	296.42	301.28	301.56	295.95	302.
111.90	99.78		223.972	6.00	296.68	302.80	303.07	295.95	303.
111.90	99.78		924.501	5.93	296.95	298.43	298.70	295.95	299.
129.12	118.49		300.106	5.97	296.62	302.04	302.33	295.65	303.
129.12	118.49		236.393	6.00	296.93	303.81	304.10	295.65	304.
129.12	118.49		981.009	5.93	297.25	298.91	299.20	295.65	300.
154.60	130.97		273.212	5.96	296.75	303.33	303.75	294.75	304.
154.60	130.97		218.018	5.99	297.10	305.35	305.77	294.75	306.
154.60	130.97		909.942	5.90	297.45	299.43	299.85	294.75	300.
190.04	174.62		303.564	5.97	297.12	305.01	305.44	294.35	306.
190.04	174.62		238.907	6.01	297.58	307.62	308.04	294.35	309.
190.04	174.62		1091.736	5.90	298.05	300.24	300.67	294.35	301.
199.77	162.15		259.681	5.97	297.08	305.65	306.25	294.05	307.
199.77	162.15		203.888	6.01	297.52	308.43	309.03	294.05	310.
199.77	162.15		856.487	5.89	297.95	300.55	301.14	294.05	302.
225.66	180.86		262.410	5.98	297.38	306.84	307.53	293.95	308.
225.66	180.86		205.707	6.03	297.87	309.94	310.63	293.95	311.
225.66	180.86		863.569	5.90	298.35	301.22	301.91	293.95	303.
252.23	218.28		288.963	6.00	297.68	308.05	308.71	293.75	310.
252.23	218.28		226.502	6.05	298.27	311.50	312.15	293.75	313.
252.23	218.28		1021.466	5.90	298.85	301.78	302.44	293.75	303.
303.89	255.70		281.661	6.04	298.08	310.55	311.39	293.75	313.
303.89	255.70		221.672	6.10	298.77	314.60	315.44	293.75	317.
303.89	255.70		999.627	5.92	299.45	302.96	303.80	293.75	305.
352.72	286.88		272.624	6.06	298.42	312.86	313.91	293.25	315.
352.72	286.88		215.964	6.13	299.18	317.42	318.47	293.25	320.
352.72	286.88		1022.592	5.92	299.95	303.80	304.85	293.25	306.
391.59	318.06		275.217	6.10	298.75	314.61	315.78	293.35	317.
391.59	318.06		218.895	6.17	299.60	319.55	320.71	293.35	322.
391.59	318.06		1122.641	5.94	300.45	304.34	305.50	293.35	307.
449.88	374.19		284.385	6.08	299.25	317.31	318.59	291.95	321.
449.88	374.19		639.494	6.17	314.80	322.83	324.11	291.95	326.
449.88	374.19		1241.861	5.90	301.25	305.38	306.66	291.95	309.
493.89	405.37		281.398	6.13	299.68	319.46	320.90	292.15	323.
493.89	405.37		525.465	6.22	314.80	325.39	326.83	292.15	329.
493.89	405.37		1221.644	5.93	301.85	306.40	307.84	292.15	310.
610.89	480.21		715.854	6.26	314.80	324.01	325.94	293.05	329.
610.89	480.21		392.253	6.38	314.80	331.61	333.54	293.05	336.
610.89	480.21		1043.582	6.03	303.05	309.36	311.30	293.05	314.
719.09	567.52		596.367	6.24	314.80	327.86	330.12	290.95	334.
719.09	567.52		375.696	6.36	314.80	335.54	337.80	290.95	341.
719.09	567.52		1197.248	5.98	304.45	310.95	313.21	290.95	317.

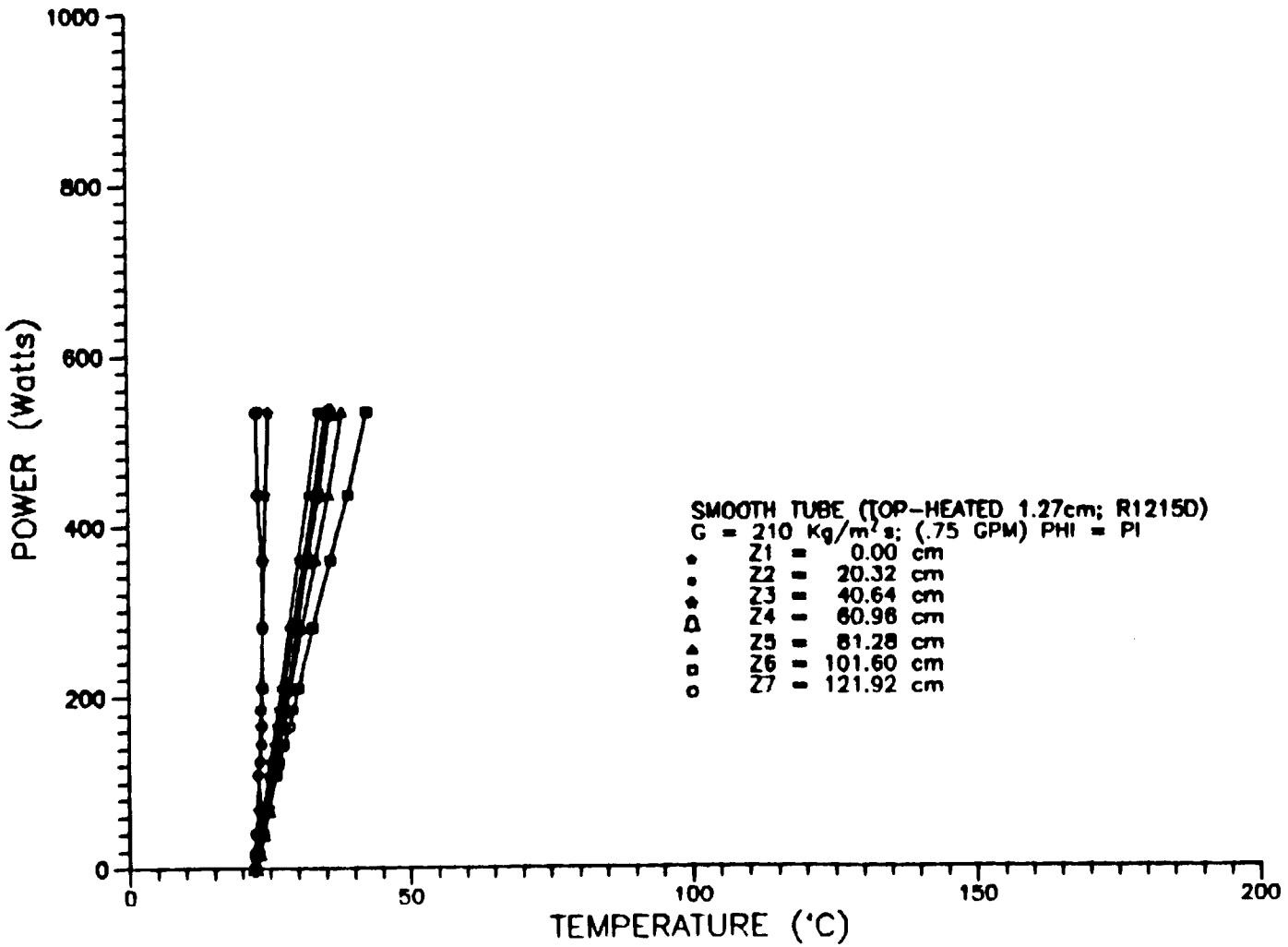

MEAN HEAT TRANSFER COEFFICIENTS
G = 210 kg/m² s; (0.75 GPM)
INLET TEMP. = 22.2 C
SPIRAL FIN LARGE PITCH; AVGH1011
SPIRAL FIN LARGE PITCH W/ TAPE; AVGH1122
SPIRAL FIN SMALL PITCH; AVGH1118
h (W/m²-K)
Power (Watts)
0
200
400
600
800
1000

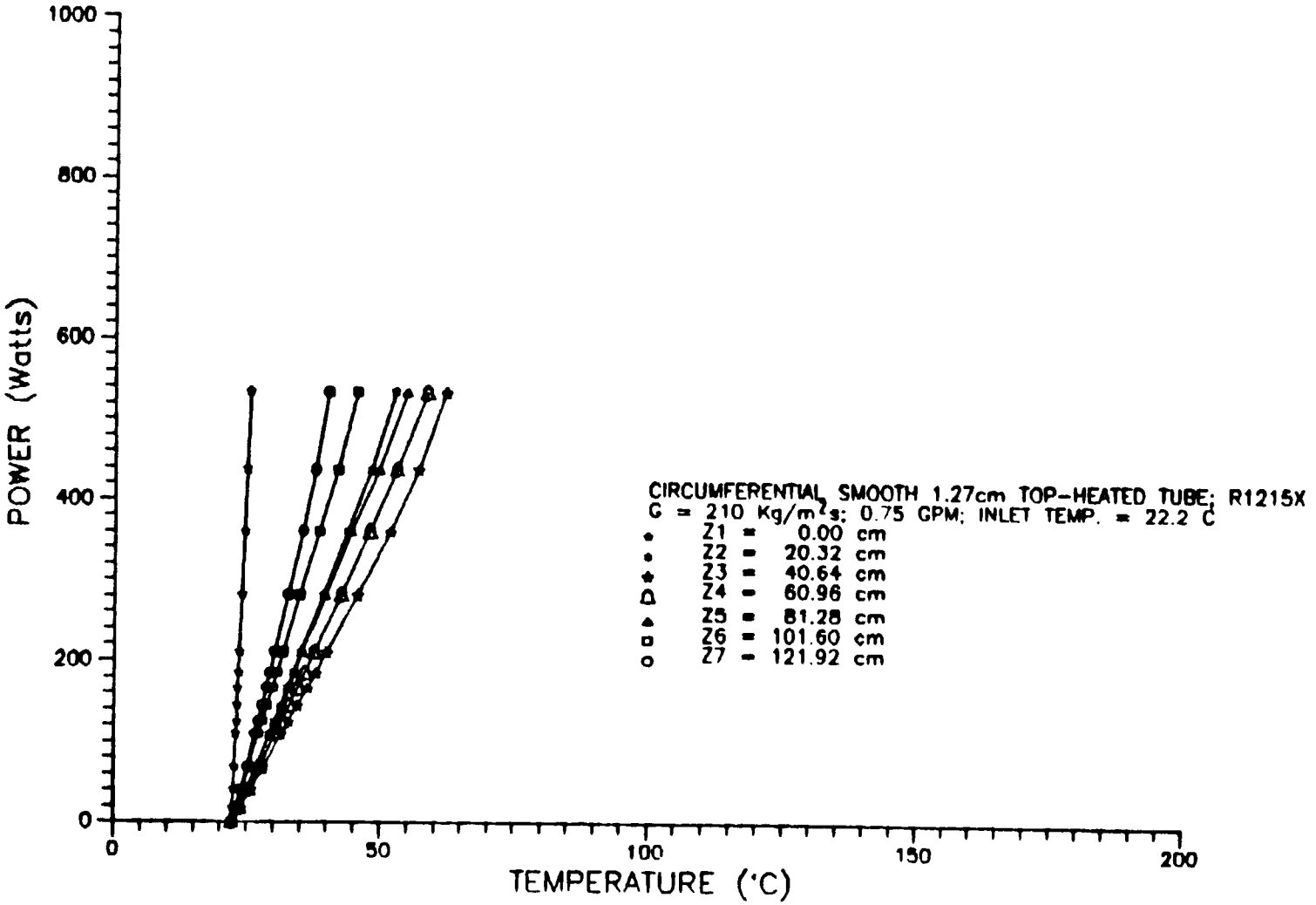

TEMPERATURE (°C)
50
40
30
20
10
0
0
200
400
600
800
1000
POWER (Watts)
SMOOTH TUBE (TOP-HEATED 1.27cm) R1215
G = 210 Kg/m² s; (.75 GPM) INLET TEMP = 22.2
▲ - INLET TEMPERATURE
● - EXIT TEMPERATURE

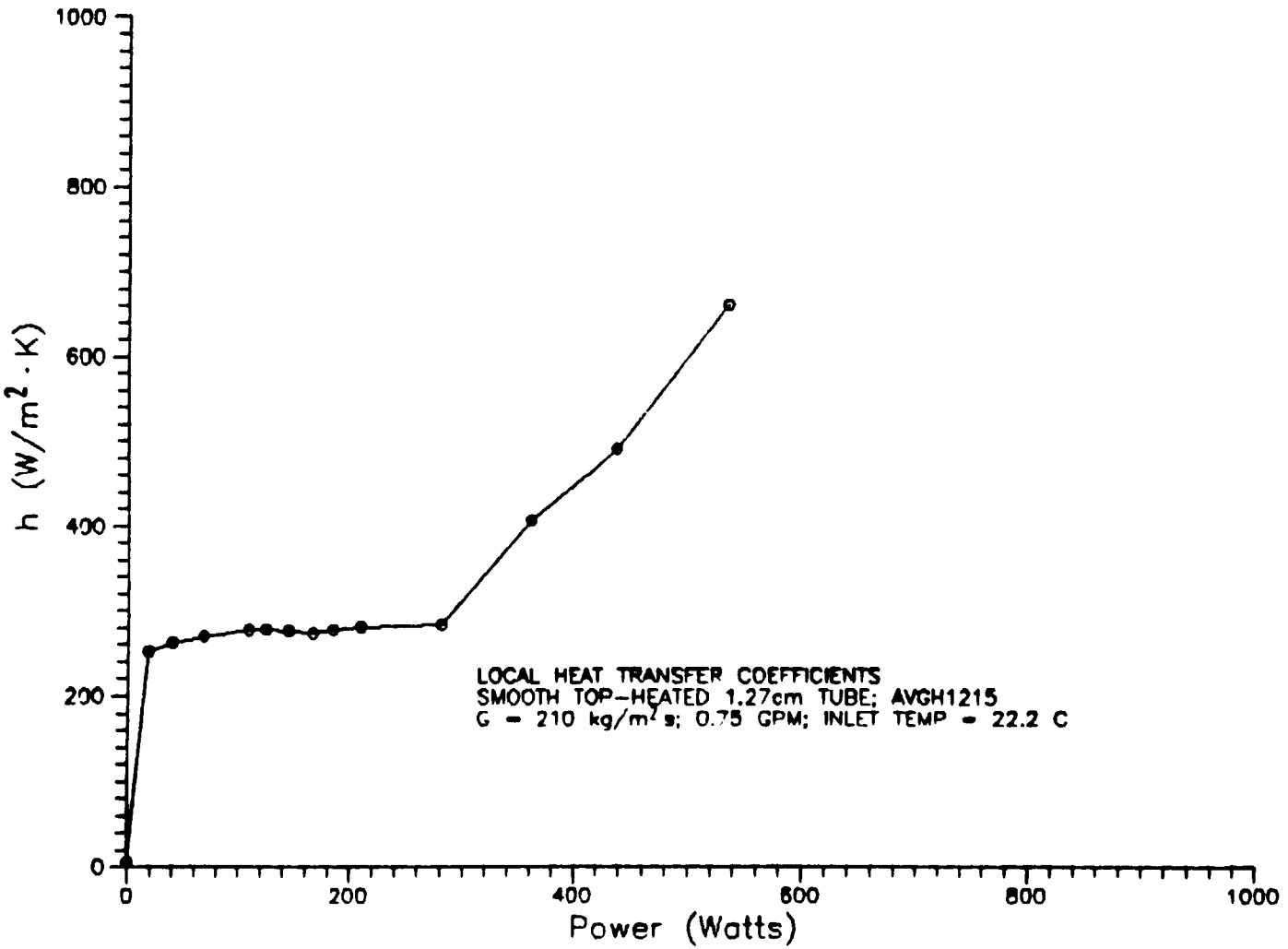

POWER (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)
SMOOTH TUBE (TOP-HEATED 1.27cm; R1215A)
G = 210 Kg/m² s; (.75 GPM) PHI = 0
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

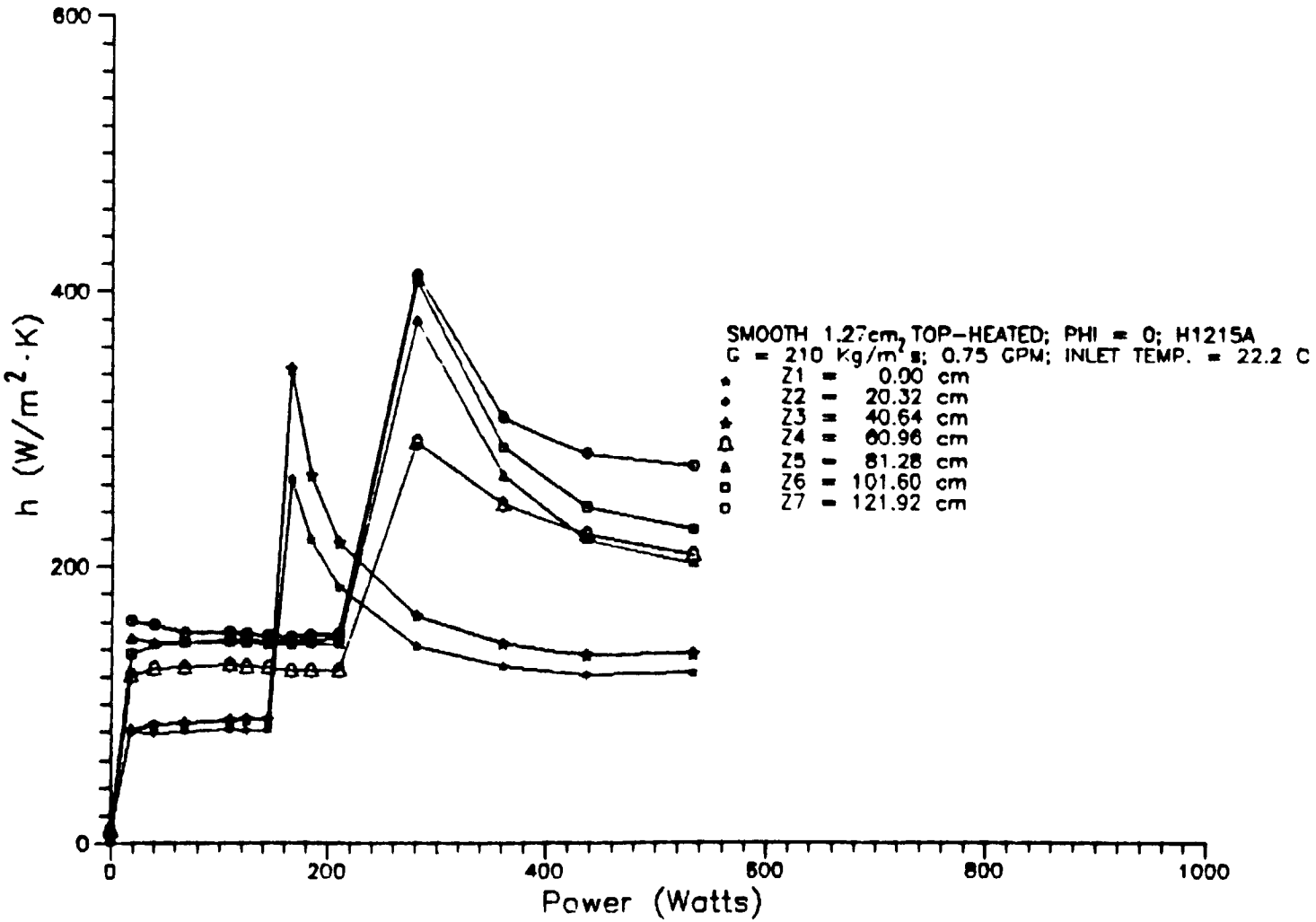

POWER (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)
SMOOTH TUBE (TOP-HEATED 1.27cm; R1215B)
G = 210 Kg/m²s; (.75 GPM) PHI = PI/4
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

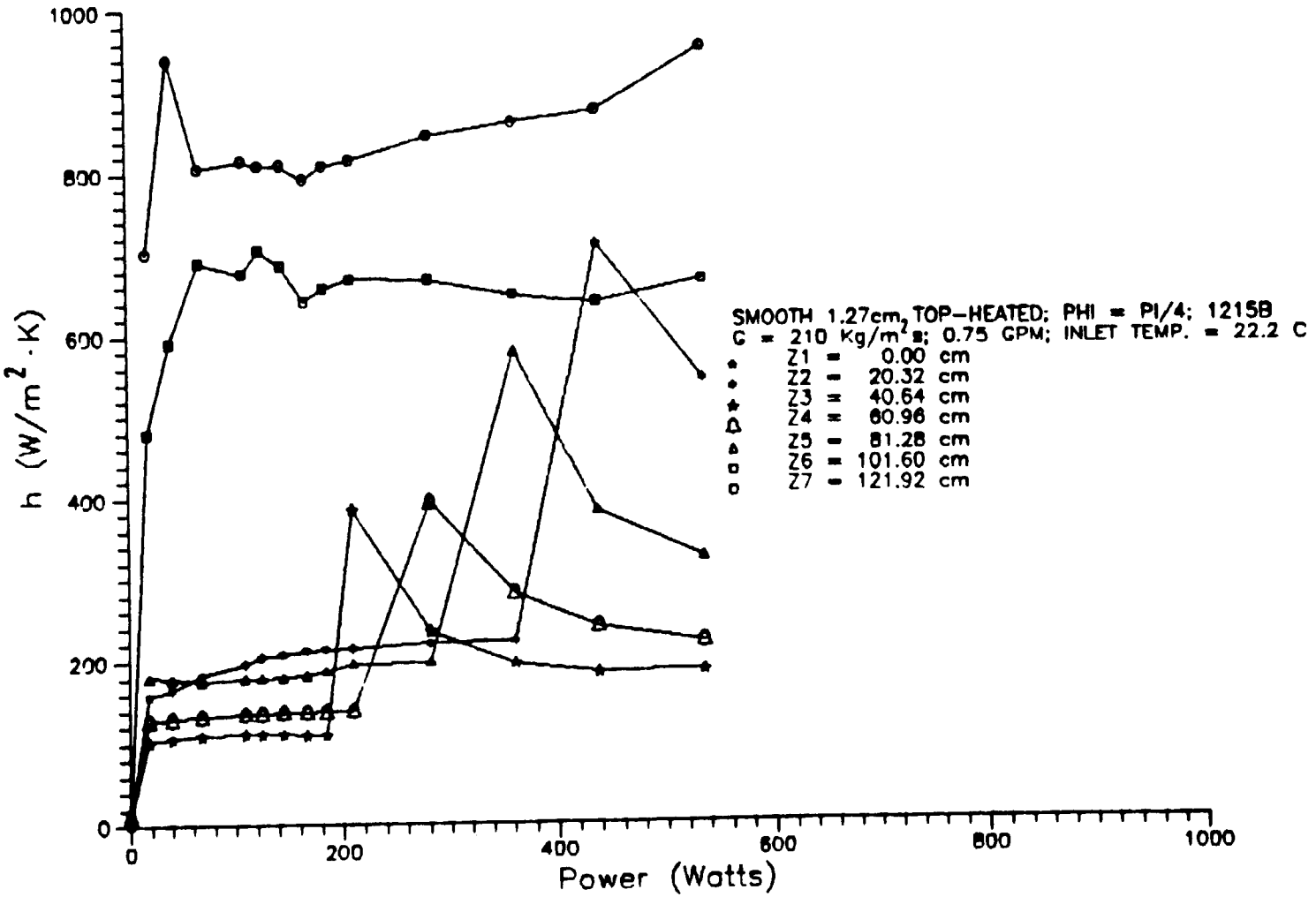

POWER (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)
SMOOTH TUBE (TOP-HEATED 1.27cm; R1215C)
G = 210 Kg/m² s; (.75 GPM) PHI = 3PI/4
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm

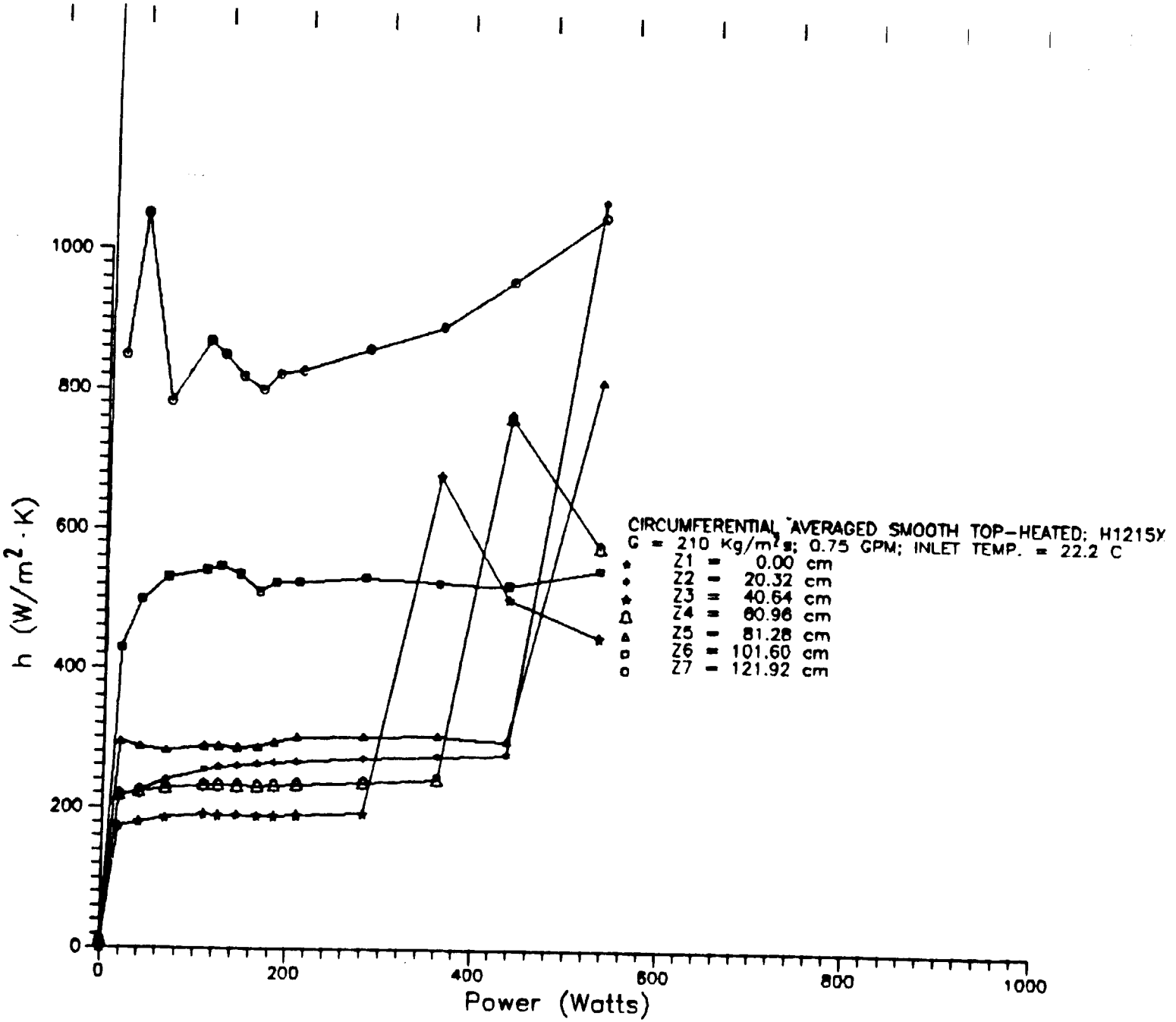

POWER (Watts)
1000
800
600
400
200
0
0
50
100
150
200
TEMPERATURE (°C)
SMOOTH TUBE (TOP-HEATED 1.27cm; R12150)
G = 210 Kg/m² s; (.75 GPM) PHI = PI
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm


1000
800
600
400
200
0
POWER (Watts)
0
50
100
150
200
TEMPERATURE (°C)
CIRCUMFERENTIAL SMOOTH 1.27cm TOP-HEATED TUBE; R1215X
G = 210 Kg/m²s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm


1000
800
600
400
200
0
h (W/m² · K)
0
200
400
600
800
1000
Power (Watts)
LOCAL HEAT TRANSFER COEFFICIENTS
SMOOTH TOP-HEATED 1.27cm TUBE; AVGH1215
G = 210 kg/m² s; 0.75 GPM; INLET TEMP = 22.2 C


SMOOTH 1.27cm, TOP-HEATED; PHI = 0; H1215A
G = 210 Kg/m² s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m².K)
Power (Watts)
0
200
400
600
800
1000


SMOOTH 1.27cm, TOP-HEATED; PHI = PI/4; 1215B
G = 210 Kg/m² s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m².K)
Power (Watts)
0
200
400
600
800
1000


CIRCUMFERENTIAL AVERAGED SMOOTH TOP-HEATED: H1215Y
G = 210 Kg/m²s; 0.75 GPM; INLET TEMP. = 22.2 C
Z1 = 0.00 cm
Z2 = 20.32 cm
Z3 = 40.64 cm
Z4 = 60.96 cm
Z5 = 81.28 cm
Z6 = 101.60 cm
Z7 = 121.92 cm
h (W/m² · K)
Power (Watts)
0
200
400
600
800
1000

H1215A.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-1827.000	-41.599	7.120	9.504
18.16	4238.677	80.060	81.820	121.230
39.92	1917.713	79.620	85.332	126.637
68.06	3459.959	80.892	87.083	127.026
109.03	4226.199	82.204	89.168	129.172
124.46	3216.573	81.474	89.444	127.883
144.55	4158.443	81.675	89.853	127.240
166.19	4467.102	263.571	344.196	125.114
184.81	3814.725	219.949	266.980	125.308
210.09	4299.448	185.261	218.055	125.398
281.62	4725.596	142.688	165.093	290.911
360.79	4487.126	128.182	144.646	245.808
437.41	4941.440	122.013	136.494	224.540
533.99	4993.768	123.753	137.776	209.712

H1215AA.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-10.580	2.028	-2071.371
18.16	147.893	136.832	160.502
39.92	145.247	143.223	157.695
68.06	144.932	144.850	151.912
109.03	145.449	146.578	152.290
124.46	144.452	147.108	151.206
144.55	143.510	146.116	149.956
166.19	144.178	145.823	149.463
184.81	144.302	147.059	150.826
210.09	144.348	147.906	151.644
281.62	379.956	408.097	412.457
360.79	267.155	287.407	309.003
437.41	220.386	243.821	283.093
533.99	203.833	228.114	274.431

H1215B.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	-1827.000	5.694	7.120	9.504
18.16	4238.677	157.640	102.630	127.534
39.92	6074.667	165.463	105.597	129.677
68.06	12560.910	182.219	108.983	132.511
109.03	-39978.640	196.743	111.717	135.090
124.46	-30477.250	204.851	110.892	136.157
144.55	-18089.400	208.113	110.990	137.046
166.19	-13092.160	212.725	109.910	137.347
184.81	-21466.230	214.560	110.193	138.506
210.09	-13711.490	215.795	386.474	139.569
281.62	-10835.900	221.927	236.967	395.544
360.79	-10701.090	224.158	197.361	284.096
437.41	-10953.010	712.205	185.337	241.845
533.99	-9336.771	545.671	187.030	222.539

H1215BB.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-10.580	2.028	-2071.371
18.16	180.231	479.958	702.144
39.92	178.651	590.678	939.334
68.06	175.064	689.818	806.694
109.03	178.765	676.793	815.865
124.46	179.709	705.704	809.650
144.55	180.342	686.416	810.312
166.19	182.587	642.786	792.992
184.81	188.687	658.383	810.098
210.09	197.052	670.345	816.653
281.62	198.789	668.826	846.669
360.79	580.484	650.714	862.877
437.41	384.818	640.820	877.867
533.99	327.162	668.300	954.043

H1215X.DAT

POWER	h(z1)	h(z2)	h(z3)	h(z4)
.00	11.902	7.191	7.120	9.504
18.16	4238.460	215.822	173.125	217.068
39.92	4780.472	224.972	179.604	222.354
68.06	18706.510	240.178	185.747	227.522
109.03	-20061.310	254.429	191.180	232.600
124.46	-90386.590	258.656	189.739	232.776
144.55	-16338.730	260.641	190.266	232.249
166.19	-13092.120	264.045	188.948	231.200
184.81	-23831.980	265.919	189.507	233.693
210.09	-15515.180	267.821	191.418	234.765
281.63	-11236.430	273.195	194.029	238.538
360.79	-11003.520	277.025	679.579	244.098
437.41	-9861.083	280.704	504.557	763.952
533.99	-9054.611	1073.944	450.235	578.267

H1215XX.DAT

POWER	h(z5)	h(z6)	h(z7)
.00	-15.476	2.580	-38.024
18.16	295.000	428.488	848.332
39.92	287.565	497.901	1049.134
68.06	282.243	530.177	781.418
109.03	288.921	540.734	868.654
124.46	288.726	546.689	849.345
144.55	287.017	535.508	818.549
166.19	288.151	511.143	799.855
184.81	295.626	523.975	823.061
210.09	303.187	525.474	828.220
281.63	304.720	532.288	860.611
360.79	306.744	526.019	893.589
437.41	299.879	523.392	959.071
533.99	817.479	546.385	1051.924

SMOOTH TOP-HEATED 1.27cm TUBE; G = 210 kg/m s; PHI = 0

R1215A.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	6.24	-191765.700		5.86	295.35	295.35	295.31	295.65	295.
.00	6.24	-4459.668		5.86	295.37	295.35	295.31	295.65	295.
.00	6.24	1145.133		5.86	295.38	295.45	295.41	295.65	295.
.00	6.24	1528.482		5.86	295.40	295.45	295.41	295.65	295.
18.16	24.97	5052.736		5.86	295.35	295.41	295.38	295.65	295.
18.16	24.97	98.264		5.91	295.42	298.51	298.49	295.65	298.
18.16	24.97	100.424		5.91	295.48	298.51	298.49	295.65	298.
18.16	24.97	147.528		5.89	295.55	297.61	297.59	295.65	297.
39.92	56.19	2339.649		5.89	295.35	295.64	295.57	296.15	295.
39.92	56.19	99.959		5.99	295.50	302.35	302.28	296.15	302.
39.92	56.19	106.991		5.98	295.65	302.05	301.98	296.15	302.
39.92	56.19	157.484		5.96	295.80	300.15	300.08	296.15	300.
68.06	74.92	3303.047		5.90	295.35	295.63	295.65	296.25	296.
68.06	74.92	79.465		6.07	295.55	307.04	307.06	296.25	307.
68.06	74.92	85.416		6.06	295.75	306.44	306.46	296.25	306.
68.06	74.92	123.619		6.01	295.95	303.34	303.36	296.25	303.
109.03	106.14	3571.499		5.89	295.35	295.71	295.84	296.05	296.
109.03	106.14	71.463		6.17	295.63	313.74	313.87	296.05	314.
109.03	106.14	77.381		6.15	295.92	312.63	312.76	296.05	313.
109.03	106.14	111.248		6.08	296.20	307.83	307.96	296.05	308.
124.46	118.63	2660.763		5.91	295.35	295.89	296.06	296.45	296.
124.46	118.63	69.333		6.23	295.67	316.52	316.69	296.45	317.
124.46	118.63	75.956		6.21	295.98	315.02	315.18	296.45	315.
124.46	118.63	107.803		6.12	296.30	309.71	309.88	296.45	310.
144.55	131.11	3271.946		5.94	295.35	295.84	296.08	296.95	296.
144.55	131.11	66.117		6.31	295.70	319.87	320.11	296.95	320.
144.55	131.11	72.579		6.28	296.05	318.07	318.30	296.95	319.
144.55	131.11	102.044		6.19	296.40	312.06	312.30	296.95	313.
166.19	143.60	3349.588		5.93	295.35	295.87	296.19	296.75	297.
166.19	143.60	203.321		6.36	314.80	323.41	323.73	296.75	324.
166.19	143.60	264.961		6.33	314.80	321.41	321.73	296.75	322.
166.19	143.60	95.653		6.22	296.50	314.80	315.12	296.75	316.
184.81	162.33	2909.223		5.92	295.35	296.03	296.37	296.45	297.
184.81	162.33	172.505		6.39	314.80	326.27	326.61	296.45	327.
184.81	162.33	208.997		6.36	314.80	324.27	324.61	296.45	325.
184.81	162.33	97.425		6.24	296.65	316.96	317.30	296.45	318.
210.09	181.06	3217.351		5.93	295.35	296.04	296.44	296.45	297.
210.09	181.06	142.556		6.46	314.80	330.28	330.69	296.45	331.
210.09	181.06	167.471		6.42	314.80	327.98	328.39	296.45	329.
210.09	181.06	95.667		6.29	296.80	319.87	320.27	296.45	321.
281.62	237.25	3456.954		5.95	295.35	296.19	296.77	296.65	298.
281.62	237.25	107.316		6.67	314.80	341.75	342.33	296.65	343.
281.62	237.25	123.889		6.61	314.80	338.14	338.72	296.65	340.
281.62	237.25	216.965		6.44	314.80	328.13	328.71	296.65	330.
360.79	299.69	3236.722		5.97	295.35	296.48	297.25	296.95	299.
360.79	299.69	94.992		6.88	314.80	353.25	354.03	296.95	355.
360.79	299.69	106.970		6.81	314.80	348.95	349.72	296.95	351.
360.79	299.69	180.570		6.58	314.80	335.03	335.80	296.95	337.
437.41	362.13	3554.434		5.93	295.35	296.59	297.54	295.75	299.
437.41	362.13	90.113		7.02	314.80	363.78	364.73	295.75	367.
437.41	362.13	100.602		6.93	314.80	358.67	359.62	295.75	361.
437.41	362.13	164.380		6.64	314.80	341.65	342.60	295.75	344.
533.99	424.56	3449.607		5.95	295.35	296.85	298.12	295.95	300.
533.99	424.56	87.631		7.22	314.80	373.85	375.12	295.95	377.
533.99	424.56	97.372		7.11	314.80	367.94	369.22	295.95	371.
533.99	424.56	147.345		6.80	314.80	349.92	351.19	295.95	353.

SMOOTH TOP-HEATED 1.27cm TUBE; G = 210 kg/m s; PHI = 0

R1215AA.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	6.24		-1134.708	5.86	295.42	295.35	295.31	295.65	295.	
.00	6.24		652.606	5.86	295.43	295.55	295.51	295.65	295.	
.00	6.24		-356136.300	5.86	295.45	295.45	295.41	295.65	295.	
18.16	24.97		179.468	5.89	295.62	297.31	297.29	295.65	297.	
18.16	24.97		166.357	5.89	295.68	297.51	297.49	295.65	297.	
18.16	24.97		194.769	5.89	295.75	297.31	297.29	295.65	297.	
39.92	56.19		180.317	5.95	295.95	299.75	299.68	296.15	300.	
39.92	56.19		177.956	5.95	296.10	299.95	299.88	296.15	300.	
39.92	56.19		195.770	5.95	296.25	299.75	299.68	296.15	300.	
68.06	74.92		140.796	6.00	296.15	302.64	302.66	296.25	303.	
68.06	74.92		140.787	6.00	296.35	302.84	302.86	296.25	303.	
68.06	74.92		147.615	6.00	296.55	302.74	302.76	296.25	303.	
109.03	106.14		125.069	6.06	296.48	306.83	306.96	296.05	307.	
109.03	106.14		126.079	6.06	296.77	307.03	307.16	296.05	307.	
109.03	106.14		130.972	6.06	297.05	306.93	307.06	296.05	307.	
124.46	118.63		121.569	6.11	296.62	308.51	308.68	296.45	309.	
124.46	118.63		123.821	6.11	296.93	308.61	308.78	296.45	309.	
124.46	118.63		127.270	6.11	297.25	308.61	308.78	296.45	309.	
144.55	131.11		114.901	6.16	296.75	310.66	310.89	296.95	311.	
144.55	131.11		117.001	6.17	297.10	310.76	310.99	296.95	311.	
144.55	131.11		120.076	6.17	297.45	310.76	310.99	296.95	311.	
166.19	143.60		109.999	6.19	296.88	312.79	313.11	296.75	314.	
166.19	143.60		111.278	6.19	297.27	312.99	313.31	296.75	314.	
166.19	143.60		114.055	6.19	297.65	312.99	313.31	296.75	314.	
184.81	162.33		111.962	6.21	297.08	314.75	315.09	296.45	316.	
184.81	162.33		114.112	6.21	297.52	314.85	315.19	296.45	316.	
184.81	162.33		117.035	6.21	297.95	314.85	315.19	296.45	316.	
210.09	181.06		109.899	6.25	297.28	317.36	317.77	296.45	318.	
210.09	181.06		112.607	6.25	297.77	317.36	317.77	296.45	318.	
210.09	181.06		115.453	6.25	298.25	317.36	317.77	296.45	318.	
281.62	237.25		282.837	6.39	314.80	325.02	325.61	296.65	327.	
281.62	237.25		303.655	6.38	314.80	324.32	324.91	296.65	326.	
281.62	237.25		306.880	6.38	314.80	324.22	324.81	296.65	326.	
360.79	299.69		196.101	6.55	314.80	333.43	334.20	296.95	336.	
360.79	299.69		210.834	6.53	314.80	332.12	332.90	296.95	334.	
360.79	299.69		226.547	6.51	314.80	330.92	331.70	296.95	333.	
437.41	362.13		161.371	6.65	314.80	342.15	343.10	295.75	345.	
437.41	362.13		178.347	6.61	314.80	339.55	340.50	295.75	342.	
437.41	362.13		206.795	6.55	314.80	336.14	337.09	295.75	339.	
533.99	424.56		143.260	6.82	314.80	350.92	352.19	295.95	354.	
533.99	424.56		160.128	6.75	314.80	347.12	348.39	295.95	351.	
533.99	424.56		192.305	6.66	314.80	341.71	342.98	295.95	345.	

SMOOTH TOP-HEATED 1.27cm TUBE; G = 210 kg/m s; PHI = PI/4

R1215B.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	6.24		-191765.700	5.86	295.35	295.35	295.31	295.65	295.
.00	6.24		915.854	5.86	295.37	295.45	295.41	295.65	295.
.00	6.24		1145.133	5.86	295.38	295.45	295.41	295.65	295.
.00	6.24		1528.482	5.86	295.40	295.45	295.41	295.65	295.
18.16	24.97		5052.736	5.86	295.35	295.41	295.38	295.65	295.
18.16	24.97		190.753	5.88	295.42	297.01	296.99	295.65	297.
18.16	24.97		125.249	5.90	295.48	297.91	297.89	295.65	298.
18.16	24.97		155.053	5.89	295.55	297.51	297.49	295.65	297.
39.92	56.19		7404.129	5.88	295.35	295.44	295.37	296.15	295.
39.92	56.19		204.624	5.94	295.50	298.85	298.78	296.15	299.
39.92	56.19		131.715	5.97	295.65	300.85	300.78	296.15	301.
39.92	56.19		161.194	5.95	295.80	300.05	299.98	296.15	300.
68.06	74.92		11983.300	5.89	295.35	295.43	295.45	296.25	295.
68.06	74.92		176.176	5.97	295.55	300.73	300.76	296.25	301.
68.06	74.92		106.329	6.03	295.75	304.34	304.36	296.25	304.
68.06	74.92		128.860	6.01	295.95	303.04	303.06	296.25	303.
109.03	106.14		-33776.980	5.89	295.35	295.31	295.44	296.05	296.
109.03	106.14		168.248	6.01	295.63	303.32	303.45	296.05	304.
109.03	106.14		96.443	6.10	295.92	309.33	309.46	296.05	310.
109.03	106.14		116.253	6.07	296.20	307.33	307.46	296.05	308.
124.46	118.63		-25187.430	5.91	295.35	295.29	295.46	296.45	296.
124.46	118.63		171.359	6.04	295.67	304.10	304.27	296.45	305.
124.46	118.63		93.700	6.15	295.98	311.41	311.58	296.45	312.
124.46	118.63		114.651	6.11	296.30	308.91	309.08	296.45	309.
144.55	131.11		-14221.680	5.93	295.35	295.24	295.47	296.95	296.
144.55	131.11		165.583	6.08	295.70	305.35	305.59	296.95	306.
144.55	131.11		89.214	6.22	296.05	313.96	314.20	296.95	315.
144.55	131.11		109.765	6.17	296.40	310.96	311.19	296.95	312.
166.19	143.60		-9810.408	5.92	295.35	295.17	295.49	296.75	296.
166.19	143.60		161.263	6.10	295.73	306.59	306.91	296.75	307.
166.19	143.60		84.212	6.26	296.12	316.90	317.22	296.75	318.
166.19	143.60		104.831	6.20	296.50	313.19	313.52	296.75	314.
184.81	162.33		-16359.330	5.91	295.35	295.23	295.57	296.45	296.
184.81	162.33		165.397	6.10	295.78	307.75	308.08	296.45	309.
184.81	162.33		85.858	6.28	296.22	319.26	319.60	296.45	320.
184.81	162.33		107.495	6.21	296.65	315.05	315.39	296.45	316.
210.09	181.06		-10252.830	5.91	295.35	295.13	295.54	296.45	296.
210.09	181.06		163.225	6.13	295.83	309.35	309.76	296.45	310.
210.09	181.06		295.426	6.33	314.80	322.27	322.68	296.45	323.
210.09	181.06		106.277	6.26	296.80	317.56	317.97	296.45	319.
281.62	237.25		-7921.342	5.93	295.35	294.98	295.57	296.65	297.
281.62	237.25		164.057	6.21	295.98	313.61	314.19	296.65	315.
281.62	237.25		177.059	6.49	314.80	331.13	331.71	296.65	333.
281.62	237.25		294.368	6.39	314.80	324.62	325.21	296.65	326.
360.79	299.69		-7713.025	5.95	295.35	294.88	295.65	296.95	297.
360.79	299.69		163.375	6.31	296.15	318.51	319.28	296.95	321.
360.79	299.69		145.322	6.66	314.80	339.93	340.71	296.95	342.
360.79	299.69		208.426	6.54	314.80	332.33	333.10	296.95	335.
437.41	362.13		-7873.393	5.90	295.35	294.79	295.74	295.75	298.
437.41	362.13		517.643	6.34	314.80	323.33	324.27	295.75	326.
437.41	362.13		135.982	6.73	314.80	347.26	348.21	295.75	350.
437.41	362.13		176.915	6.61	314.80	339.75	340.70	295.75	343.
533.99	424.56		-6445.019	5.92	295.35	294.55	295.82	295.95	298.
533.99	424.56		380.738	6.45	314.80	328.39	329.67	295.95	332.
533.99	424.56		131.587	6.87	314.80	354.12	355.40	295.95	358.
533.99	424.56		156.255	6.77	314.80	347.92	349.19	295.95	351.

SMOOTH TOP-HEATED 1.27cm TUBE; G = 210 kg/m s; PHI = PI/4

R1215BB.TER

A(I)	Preal	hl(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	6.24		-1134.708	5.86	295.42	295.35	295.31	295.65	295.	
.00	6.24		652.606	5.86	295.43	295.55	295.51	295.65	295.	
.00	6.24		-356136.300	5.86	295.45	295.45	295.41	295.65	295.	
18.16	24.97		218.089	5.88	295.62	297.01	296.99	295.65	297.	
18.16	24.97		576.438	5.87	295.68	296.21	296.18	295.65	296.	
18.16	24.97		842.478	5.87	295.75	296.11	296.08	295.65	296.	
39.92	56.19		221.122	5.94	295.95	299.05	298.98	296.15	299.	
39.92	56.19		724.892	5.91	296.10	297.04	296.98	296.15	297.	
39.92	56.19		1151.813	5.91	296.25	296.84	296.78	296.15	297.	
68.06	74.92		169.599	5.98	296.15	301.53	301.56	296.25	302.	
68.06	74.92		661.969	5.93	296.35	297.73	297.75	296.25	298.	
68.06	74.92		774.126	5.93	296.55	297.73	297.75	296.25	298.	
109.03	106.14		153.258	6.03	296.48	304.92	305.05	296.05	305.	
109.03	106.14		574.898	5.94	296.77	299.02	299.15	296.05	299.	
109.03	106.14		692.932	5.94	297.05	298.92	299.05	296.05	299.	
124.46	118.63		150.762	6.07	296.62	306.21	306.37	296.45	307.	
124.46	118.63		586.552	5.97	296.93	299.40	299.56	296.45	300.	
124.46	118.63		672.948	5.97	297.25	299.40	299.56	296.45	300.	
144.55	131.11		143.912	6.12	296.75	307.85	308.09	296.95	308.	
144.55	131.11		542.747	6.00	297.10	300.04	300.28	296.95	301.	
144.55	131.11		640.635	6.00	297.45	299.94	300.18	296.95	301.	
166.19	143.60		138.830	6.14	296.88	309.49	309.81	296.75	310.	
166.19	143.60		484.450	6.01	297.27	300.88	301.20	296.75	302.	
166.19	143.60		597.475	6.00	297.65	300.58	300.90	296.75	301.	
184.81	162.33		145.844	6.15	297.08	310.65	310.99	296.45	312.	
184.81	162.33		504.592	6.01	297.52	301.44	301.78	296.45	302.	
184.81	162.33		620.699	6.00	297.95	301.14	301.48	296.45	302.	
210.09	181.06		149.376	6.17	297.28	312.06	312.46	296.45	313.	
210.09	181.06		504.093	6.02	297.77	302.14	302.55	296.45	303.	
210.09	181.06		613.963	6.01	298.25	301.84	302.25	296.45	303.	
281.62	237.25		147.301	6.27	297.88	317.51	318.10	296.65	319.	
281.62	237.25		491.677	6.07	298.52	304.40	304.98	296.65	306.	
281.62	237.25		622.194	6.06	299.15	303.80	304.38	296.65	305.	
360.79	299.69		424.065	6.39	314.80	323.41	324.19	296.95	326.	
360.79	299.69		471.717	6.14	299.35	307.09	307.87	296.95	309.	
360.79	299.69		625.196	6.12	300.15	305.99	306.77	296.95	308.	
437.41	362.13		280.484	6.46	314.80	330.54	331.48	295.75	333.	
437.41	362.13		463.294	6.13	300.18	309.71	310.66	295.75	313.	
437.41	362.13		634.276	6.10	301.15	308.11	309.05	295.75	311.	
533.99	424.56		228.937	6.59	314.80	337.40	338.68	295.95	341.	
533.99	424.56		463.893	6.19	301.02	312.17	313.44	295.95	316.	
533.99	424.56		661.775	6.15	302.15	309.97	311.24	295.95	314.	

CIRCUMFERENTIAL SMOOTH TOP-HEATED 1.27cm TUBE; G = 210 kg/m s

R1215X.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)		
.00	6.24		1532.240	5.86	295.35	295.40	295.36	295.65	295.
.00	6.24		1086.255	5.86	295.37	295.44	295.40	295.65	295.
.00	6.24		1145.133	5.86	295.38	295.45	295.41	295.65	295.
.00	6.24		1528.482	5.86	295.40	295.45	295.41	295.65	295.
18.16	24.97		5052.736	5.86	295.35	295.41	295.38	295.65	295.
18.16	24.97		260.122	5.88	295.42	296.59	296.56	295.65	296.
18.16	24.97		209.346	5.88	295.48	296.94	296.91	295.65	297.
18.16	24.97		261.932	5.88	295.55	296.71	296.68	295.65	296.
39.92	56.19		5827.556	5.89	295.35	295.47	295.40	296.15	295.
39.92	56.19		277.180	5.92	295.50	297.97	297.90	296.15	298.
39.92	56.19		222.006	5.93	295.65	298.73	298.67	296.15	299.
39.92	56.19		274.334	5.93	295.80	298.30	298.23	296.15	298.
68.06	74.92		17842.760	5.89	295.35	295.40	295.42	296.25	295.
68.06	74.92		231.495	5.95	295.55	299.49	299.52	296.25	300.
68.06	74.92		179.632	5.97	295.75	300.83	300.86	296.25	301.
68.06	74.92		219.633	5.96	295.95	300.11	300.13	296.25	300.
109.03	106.14		-16942.490	5.89	295.35	295.27	295.40	296.05	296.
109.03	106.14		216.994	5.98	295.63	301.59	301.73	296.05	302.
109.03	106.14		163.620	6.01	295.92	303.82	303.95	296.05	304.
109.03	106.14		198.722	6.00	296.20	302.71	302.84	296.05	303.
124.46	118.63		-74727.990	5.91	295.35	295.33	295.50	296.45	296.
124.46	118.63		215.854	6.01	295.67	302.36	302.53	296.45	303.
124.46	118.63		158.931	6.05	295.98	305.08	305.25	296.45	306.
124.46	118.63		194.619	6.03	296.30	303.73	303.89	296.45	304.
144.55	131.11		-12846.960	5.93	295.35	295.23	295.46	296.95	296.
144.55	131.11		206.906	6.05	295.70	303.42	303.66	296.95	304.
144.55	131.11		151.604	6.10	296.05	306.59	306.83	296.95	307.
144.55	131.11		184.721	6.08	296.40	305.05	305.29	296.95	306.
166.19	143.60		-9810.408	5.92	295.35	295.17	295.49	296.75	296.
166.19	143.60		199.740	6.06	295.73	304.50	304.82	296.75	305.
166.19	143.60		143.492	6.12	296.12	308.31	308.63	296.75	309.
166.19	143.60		175.251	6.09	296.50	306.49	306.81	296.75	307.
184.81	162.33		-18160.230	5.91	295.35	295.24	295.58	296.45	296.
184.81	162.33		204.556	6.07	295.78	305.46	305.79	296.45	306.
184.81	162.33		146.354	6.13	296.22	309.73	310.07	296.45	311.
184.81	162.33		180.128	6.10	296.65	307.63	307.97	296.45	309.
210.09	181.06		-11601.670	5.91	295.35	295.16	295.57	296.45	296.
210.09	181.06		202.149	6.09	295.83	306.75	307.16	296.45	308.
210.09	181.06		145.043	6.16	296.32	311.53	311.94	296.45	313.
210.09	181.06		177.555	6.13	296.80	309.23	309.64	296.45	310.
281.63	237.25		-8213.860	5.93	295.35	295.00	295.58	296.65	297.
281.63	237.25		201.555	6.16	295.98	310.33	310.91	296.65	312.
281.63	237.25		143.706	6.26	296.62	316.74	317.32	296.65	318.
281.63	237.25		176.340	6.21	297.25	313.65	314.23	296.65	315.
360.79	299.69		-7931.266	5.95	295.35	294.89	295.66	296.95	297.
360.79	299.69		201.503	6.25	296.15	314.28	315.05	296.95	317.
360.79	299.69		496.162	6.37	314.80	322.16	322.94	296.95	324.
360.79	299.69		177.889	6.31	297.75	318.28	319.06	296.95	321.
437.41	362.13		-7088.137	5.90	295.35	294.73	295.68	295.75	298.
437.41	362.13		203.596	6.26	296.32	317.99	318.94	295.75	321.
437.41	362.13		367.223	6.40	314.80	326.82	327.77	295.75	330.
437.41	362.13		555.128	6.33	314.80	322.75	323.70	295.75	326.
533.99	424.56		-6250.212	5.92	295.35	294.52	295.80	295.95	298.
533.99	424.56		747.740	6.34	314.80	321.72	322.99	295.95	325.
533.99	424.56		314.438	6.49	314.80	331.26	332.53	295.95	335.
533.99	424.56		403.384	6.43	314.80	327.63	328.90	295.95	331.

CIRCUMFERENTIAL SMOOTH TOP-HEATED 1.27cm TUBE; G = 210 kg/m s
R1215XX.TER

A(I)	Preal	h1(J)	HRAD	TF	TW	TWI	TO	T(I,J)	
.00	6.24		-1810.424	5.86	295.42	295.37	295.33	295.65	295.
.00	6.24		734.735	5.86	295.43	295.54	295.50	295.65	295.
.00	6.24		-5744.134	5.86	295.45	295.44	295.40	295.65	295.
18.16	24.97		355.178	5.88	295.62	296.47	296.45	295.65	296.
18.16	24.97		514.925	5.87	295.68	296.27	296.25	295.65	296.
18.16	24.97		1017.350	5.87	295.75	296.05	296.02	295.65	296.
39.92	56.19		354.169	5.92	295.95	297.88	297.82	296.15	298.
39.92	56.19		611.496	5.91	296.10	297.22	297.15	296.15	297.
39.92	56.19		1286.143	5.90	296.25	296.78	296.71	296.15	297.
68.06	74.92		272.048	5.95	296.15	299.51	299.53	296.25	300.
68.06	74.92		509.290	5.93	296.35	298.14	298.17	296.25	298.
68.06	74.92		749.932	5.93	296.55	297.77	297.79	296.25	298.
109.03	106.14		246.463	5.98	296.48	301.73	301.86	296.05	302.
109.03	106.14		459.728	5.95	296.77	299.58	299.71	296.05	300.
109.03	106.14		737.630	5.94	297.05	298.80	298.93	296.05	299.
124.46	118.63		241.030	6.02	296.62	302.62	302.78	296.45	303.
124.46	118.63		454.827	5.98	296.93	300.11	300.28	296.45	301.
124.46	118.63		705.842	5.97	297.25	299.30	299.46	296.45	300.
144.55	131.11		227.934	6.06	296.75	303.76	304.00	296.95	304.
144.55	131.11		423.834	6.01	297.10	300.87	301.11	296.95	301.
144.55	131.11		647.127	6.00	297.45	299.92	300.16	296.95	301.
166.19	143.60		218.067	6.07	296.88	304.91	305.23	296.75	306.
166.19	143.60		385.599	6.02	297.27	301.81	302.13	296.75	303.
166.19	143.60		602.630	6.00	297.65	300.55	300.87	296.75	301.
184.81	162.33		227.477	6.07	297.08	305.78	306.12	296.45	307.
184.81	162.33		401.949	6.02	297.52	302.44	302.78	296.45	303.
184.81	162.33		630.600	6.00	297.95	301.09	301.42	296.45	302.
210.09	181.06		228.876	6.09	297.28	306.93	307.33	296.45	308.
210.09	181.06		395.534	6.04	297.77	303.35	303.75	296.45	304.
210.09	181.06		622.638	6.01	298.25	301.79	302.20	296.45	303.
281.63	237.25		224.870	6.17	297.88	310.74	311.33	296.65	312.
281.63	237.25		391.658	6.09	298.52	305.90	306.48	296.65	308.
281.63	237.25		632.409	6.06	299.15	303.72	304.30	296.65	305.
360.79	299.69		223.187	6.26	298.55	314.92	315.69	296.95	317.
360.79	299.69		381.652	6.16	299.35	308.92	309.69	296.95	311.
360.79	299.69		647.390	6.11	300.15	305.79	306.57	296.95	308.
437.41	362.13		217.631	6.28	299.22	319.50	320.44	295.75	322.
437.41	362.13		378.710	6.16	300.18	311.84	312.78	295.75	315.
437.41	362.13		692.791	6.10	301.15	307.52	308.47	295.75	310.
533.99	424.56		569.568	6.37	314.80	323.89	325.16	295.95	327.
533.99	424.56		379.566	6.23	301.02	314.65	315.92	295.95	318.
533.99	424.56		729.503	6.14	302.15	309.24	310.52	295.95	313.