REMTECH inc.

Huntsville, Alabama
TABLE OF CONTENTS

VOLUME II

APPENDIX A   AEROTHERMAL COMPARISONS
APPENDIX B   FLIGHT-DERIVED $h_i/h_u$ vs. $M_e$ PLOTS
APPENDIX A

AERO THERMAL COMPARISONS
NOTE:
- Thermal Mismatch was Considered

Fig. A.1a Aerothermal Analysis for Gage 9001 in STS-1
NOTE:

- Thermal Mismatch was Considered

Fig. A.1b  Aerothermals Analysis for Gage 9001 in STS-2
NOTE:
- Thermal Mismatch was Considered

Fig. A.1c Aerothermal Analysis for Gage 9001 in STS-3
NOTE:
- Thermal Mismatch was Considered

Fig. A.1d Aerothermal Analysis for Gage 9001 in STS-4
NOTE:
• Thermal Mismatch was Considered

Fig. A.1e Aerothermal Analysis for Gage 9001 in STS-5
NOTE:
- Thermal Mismatch was Considered
- Bad Pressure Measurements

Fig. A.1f Aerothermical Analysis for Gage 9001 in STS-7
NOTE:
- Thermal Mismatch was Considered

Fig. A.2a Aerothermal Analysis for Gage 9004 in STS-2
NOTE:
- Thermal Mismatch was Considered

Fig. A.2b  Aerothermical Analysis for Gage 9004 in STS-3
NOTE:
- Thermal Mismatch was Considered

Fig. A.2c Aerothermal Analysis for Gage 9004 in STS-4
NOTE:
- Thermal Mismatch was Considered

Fig. A.2d Aerothermal Analysis for Gage 9004 in STS-5
NOTE:
- Thermal Mismatch was Considered

Fig. A.2e Aerothermal Analysis for Gage 9007 in STS-7
NOTE:
- Thermal Mismatch was Considered

Fig. A.3a  Aerothermal Analysis for Gage 9005 in STS-2
NOTE:
- Thermal Mismatch was Considered

Fig. A.3b  Aerothermal Analysis for Gage 9005 in STS-3
NOTE:
- Thermal Mismatch was Considered

Fig. A.3c Aerothermal Analysis for Gage 9005 in STS-4
NOTE:
- Thermal Mismatch was Considered

Fig. A.3d Aerothermal Analysis for Gage 9005 in STS-5
NOTE:
• Thermal Mismatch was Considered

Fig. A.3e Aerothermal Analysis for Gage 9005 in STS-7
NOTE:
- Thermal Mismatch was Considered

Fig. A.4a Aerothermal Analysis for Gage 9007 in STS-2
Fig. A.4b  Aerothermal Analysis for Gage 9007 in STS-3

NOTE:
- Thermal Mismatch was Considered
NOTE:
- Thermal Mismatch was Considered

Fig. A.4c  Aerothermial Analysis for Gage 9007 in STS-4
NOTE:
- Thermal Mismatch was Considered

Fig. A.4d  Aerothermal Analysis for Gage 9007 in STS-5
NOTE:
- Thermal Mismatch was Considered

Fig. A.4e Aerothermal Analysis for Gage 9007 in STS-7
NOTE:
- Thermal Mismatch was Considered

Fig. A.5a Aerothermal Analysis for Gage 9008 in STS-2
NOTE:
- Thermal Mismatch was Considered

Fig. A.5b  Aerothermal Analysis for Gage 9008 in STS-3
NOTE:
- Thermal Mismatch was Considered

Fig. A.5c  Aerothermal Analysis for Gage 9008 in STS-4
NOTE:
- Thermal Mismatch was Considered

Fig. A.5d Aerothermal Analysis for Gage 9008 in STS-5
NOTE:
- Thermal Mismatch was Considered

Fig. A.5e Aerothermal Analysis for Gage 9008 in STS-7
NOTE:

- Thermal Mismatch was Considered

Fig. A.6a Aerothermal Analysis for Gage 9010 in STS-2
NOTE:
- Thermal Mismatch was Considered

Fig. A.6b Aerothermal Analysis for Gage 9010 in STS-3
NOTE:
- Thermal Mismatch was considered

Fig. A.6c  Aerothermal Analysis for Gage 9010 in STS-4
NOTE:
- Thermal Mismatch was Considered

Fig. A.6d  Aerothermal Analysis for Gage 9010 in STS-5
NOTE:
- Thermal Mismatch was Considered

Fig. A.6e  Aerothermal Analysis for Gage 9010 in STS-7
Fig. A.7a  Aerothermal Analysis for Gage 9011 in STS-1
Fig. A.7b Aerothermal Analysis for Gage 9011 in STS-2
Fig. A.7c Aerothermal Analysis for Gage 9011 in STS-3
Fig. A.7d  Aerothermal Analysis for Gage 9011 in STS-4
Fig. A.7e  Aerothermal Analysis for Gage 9011 in STS-5
Fig. A.7f Aerothermal Analysis for Gage 9011 in STS-7
Fig. A.8a Aerothermal Analysis for Gage 9013 in STS-1
Fig. A.8b Aerothermal Analysis for Gage 9013 in STS-2
Fig. A.8c Aerothermal Analysis for Gage 9013 in STS-3
Fig. A.8d Aerothermal Analysis for Gage 9013 in STS-4
Fig. A.8e Aerothermal Analysis for Gage 9013 in STS-5
NOTE:
Bad Pressure Measurements

Fig. A.8f Aerothermal Analysis for Gage 9013 in STS-7
Fig. A.9a  Aerothermal Analysis for GAge 9014 in STS-1
Fig. A.9b Aerothermal Analysis for Gage 9014 in STS-2
Fig. A.9c  Aerothermal Analysis for Gage 9014 in STS-3
Fig. A.9d Aerothermal Analysis for GAage 9014 in STS-4
Fig. A.9e Aerothermal Analysis for Gage 9014 in STS-5
Fig. A.9f  Aerothermal Analysis for Gage 9014 in STS-7
Fig. A.10a Aerothermal Analysis for Gage 9015 in STS-1
Fig. A.10b Aerothermal Analysis for Gage 9015 in STS-2
Fig. A.10c Aerothermal Analysis for Gage 9015 in STS-3
Fig. A.10d Aerothermal Analysis for Gage 9015 in STS-4
Fig. A.10e Aerothermal Analysis for GAge 9015 in STS-5
Fig. A.10f  Aerothermal Analysis for Gage 9015 in STS-7
Fig. A.11a Aerothermcal Analysis for Gage 9016 in STS-1
Fig. A.11b Aerothermal Analysis for Gage 9016 in STS-2
Fig. A.11c Aerothermal Analysis for Gage 9016 in STS-3
Fig. A.11d Aerothermal Analysis for Gage 9016 in STS-4
Fig. A.11e Aerothermal Analysis for GAge 9016 in STS-5
Fig. A.11f Aerothermal Analysis for Gage 9016 in STS-7
Fig. A.12a Aerothermal Analysis for Gage 9017 in STS-1
Fig. A.12b Aerothermal Analysis for Gage 9017 in STS-2
Fig. A.12c  Aerothermal Analysis for Gage 9017 in STS-3
Fig. A.12d Aerothermal Analysis for Gage 9017 in STS-4
Fig. A.12e  Aerothermal Analysis for Gage 9017 in STS-5
Fig. A.12f Aerothermal Analysis for Gage 9017 in STS-7
Fig. A.13a Aerothermal Analysis for Gage 9018 in STS-1
Fig. A.13b  Aerothermal Analysis for Gage 9018 in STS-2
Fig. A.13c Aerothermal Analysis for Gage 9018 In STS-3
Fig. A.13d Aerothermal Analysis for Gage 9018 in STS-4
Fig. A.13e Aerothermal Analysis for Gage 9018 in STS-5
Fig. A.13f  Aerothermal Analysis for Gage 9018 in STS-7
Fig. A.14a Aerothermal Analysis for Gage 9019 in STS-1
Fig. A.14b Aerothermal Analysis for Gage 9019 in STS-2
Fig. A.14c  Aerothermal Analysis for Gage 9019 in STS-3
Fig. A.14d Aerothermal Analysis for Gage 9019 in STS-4
Fig. A.14e  Aerothermal Analysis for Gage 9019 in STS-5
Fig. A.14f Aerothermal Analysis for Gage 9019 In STS-7
Fig. A.15a Aerothermal Analysis for Gage 9021 in STS-1
Fig. A.15b  Aerothermal Analysis for Gage 9021 in STS-2
Fig. A.15c  Aerothermal Analysis for Gage 9021 in STS-3
Fig. A.15d Aerothermal Analysis for Gage 9021 in STS-4
Fig. A.15e  Aerothermcal Analysis for Gage 9021 in STS-5
Fig. A.15f  Aerothermal Analysis for Gage 9021 in STS-7
Fig. A.16a  Aerothermal Analysis for Gage 9022 in STS-1

NOTE:
- Bad Pressure Measurements
Fig. A.16b  Aerothermal Analysis for Gage 9022 in STS-2
Fig. A.16c  Aerothermal Analysis for Gage 9022 in STS-3
Fig. A.16d  Aerothermal Analysis for Gage 9022 in STS-4
Fig. A.16e  Aerothermal Analysis for Gage 9022 in STS-5
Fig. A.16f  Aerothermal Analysis for Gage 9022 in STS-7
Fig. A.17a  Aerothermal Analysis for Gage 9020 in STS-4
Fig. A.17b  Aerothermal Analysis for Gage 9020 in STS-5
Fig. A.17c  Aerothermal Analysis for Gage 9020 in STS-7
Fig. A.18a  Aerothermal Analysis for GAge 9023 in STS-4
Fig. A.18b  Aerothermal Analysis for GAge 9023 in STS-5
Fig. A.18c  Aerothermal Analysis for Gage 9023 in STS-7
NOTE:
- Bad Heating Rate Measurements

Fig. A.19a  Aerothermal Analysis for Gage 9025 in STS-2
NOTE:
- Bad Heating Rate Measurements

Fig. A.19b Aerothermal Analysis for Gage 9025 in STS-3
Fig. A.19c  Aerothermal Analysis for Gage 9025 in STS-4
NOTE:
- Bad Heating Rate Measurements

Fig. A.19d  Aerothermal Analysis for Gage 9025 in STS-5
Fig. A.19a  Aerothermal Analysis for Gage 9025 in STS-7
NOTE:
- Bad Pressure Measurements
- Bad Heating Rate Measurements

Fig. A.20a  Aerothermal Analysis for Gage 9026 in STS-2
NOTE:
- Bad Pressure Measurements

Fig. A.20b  Aerothermal Analysis for Gage 9026 in STS-3
Fig. A.20c  Aerothermal Analysis for Gage 9026 in STS-4
Fig. A.20d Aerothermal Analysis for GAge 9026 in STS-5
Fig. A.20e  Aerothermal Analysis for Gage 9026 in STS-7
NOTE:
- Plume-Induced Heating was Considered

Fig. A.21a  Aerothermal Analysis for Gage 9027 in STS-2
NOTE:
- Plume-Induced Heating was Considered

Fig. A.21b  Aerothermal Analysis for Gage 9027 in STS-3
NOTE:
• Plume-Induced Heating was Considered

Fig. A.21c Aerothermal Analysis for GAge 9027 in STS-4
NOTE:
- Plume-Induced Heating was Considered

Fig. A.21d  Aerothermal Analysis for Gage 9027 in STS-5
NOTE:
- Plume-Induced Heating was Considered

Fig. A.21e  Aerothermal Analysis for Gage 9027 in STS-7
NOTE:
- Plume-Induced Heating was Considered

Fig. A.22a  Aerothermal Analysis for Gage 9028 in STS-2
NOTE:
- Questionable Measurements

Fig. A.22b Aerothermal Analysis for Gage 9028 in STS-3
NOTE:
- Plume-Induced Heating was Considered

Fig. A.22c  Aerothermal Analysis for Gage 9028 in STS-4
NOTE:
- Plume-Induced Heating was Considered

Fig. A.22d  Aerothermal Analysis for Gage 9028 in STS-5
NOTE:
- Plume-Induced Heating was Considered

Fig. A.22e  Aerothermal Analysis for Gage 9028 in STS-7
NOTE:
- Plume-Induced Heating was Considered

Fig. A.23a  Aerothermal Analysis for Gage 9029 in STS-2
NOTE:
- Bad Heating Rate Measurements

Fig. A.23b  Aerothermal Analysis for Gage 9029 in STS-3
NOTE:
- Plume-Induced Heating was Considered

Fig. A.23c  Aerothermal Analysis for Gage 9029 in STS-4
NOTE:
- Plume-Induced Heating was Considered

Fig. A.23d  Aerothermal Analysis for GAge 9029 in STS-5
NOTE:
- Plume-Induced Heating was Considered
- Bad Pressure Measurements

Fig. A.23e  Aerothermal Analysis for Gage 9029 in STS-7
NOTE:
- Plume-Induced Heating was Considered
- Bad Pressure Measurements

Fig. A.24a  Aerothermal Analysis for Gage 9030 in STS-2
NOTE:
- Bad Pressure Measurements
- Questionable Measurements

Fig. A.24b  Aerothermam Analysis for Gage 9030 from STS-3
NOTE:
- Plume-Induced Heating was Considered
- Questionable Measurements

Fig. A.24c  Aerothermal Analysis For Gage 9030 in STS-4
NOTE:
- Plume-Induced Heating was Considered

Fig. A.24d  Aerothermal Analysis for Gage 9030 in STS-5
NOTE:
- Plume-Induced Heating was Considered

Fig. A.24e  Aerothermal Analysis for Gage 9030 in STS-7
NOTE:
- Plume-Induced Heating was Considered

Fig. A.25a Aerothermal Analysis for Gage 9031 in STS-2
NOTE:
- Plume-Induced Heating was Considered

Fig. A.25b  Aerothermal Analysis for Gage 9031 in STS-3
NOTE:
- Plume-Induced Heating was Considered

Fig. A.25c  Aerothermal Analysis for Gage 9031 in STS-4
NOTE:
- Plume-Induced Heating was Considered

Fig. A.35d  Aerothermal Analysis for Gage 9031 in STS-5
NOTE:
• Plume-Induced Heating was Considered

Fig. A.25e Aerothermal Analysis for Gage 9031 in STS-7
NOTE:
• Plume-Induced Heating was Considered

Fig. A.26a  Aerothermal Analysis for Gage 9032 in STS-2
Fig. A.26b  Aerothermal Analysis for Gage 9032 in STS-3
Fig. A.26c  Aerothermal Analysis for Gage 9032 in STS-4

NOTE:
- Questionable Measurements
NOTE:
- Plume-Induced Heating was Considered

Fig. A.26d  Aerothermal Analysis for Gage 9032 in STS-5
NOTE:
- Plume-Induced Heating was Considered

Fig. A.26e  Aerothermal Analysis for GAge 9032 in STS-7
Fig. A.27b Aerothermal Analysis for Gage 9012 in STS-2
Fig. A.27c Aerothermal Analysis for Gage 9012 in STS-3
Fig. A.27d Aerothermal Analysis for Gage 9012 in STS-4
Fig. A.27e Aerothermal Analysis for Gage 9012 in STS-5
Fig. A.27f Aerothermal Analysis for Gage 9012 in STS-7
Fig. A.28a  Aerothermcal Analysis for Gage 9038 in STS-1
Fig. A.28b  Aerothermal Analysis for GAge 9038 in STS-2
Fig. A.28c  Aerothermal Analysis for Gage 9038 in STS-3
Fig. A.28d  Aerothermal Analysis for Gage 9038 in STS-4
Fig. A.28e  Aerothermal Analysis for Gage 9038 in STS-5
Fig. A.28f  Aerothermal Analysis for Gage 9038 in STS-7
Fig. A.29a Aerothermal Analysis for Gage 9039 in STS-1
Fig. A.29b  Aerothermal Analysis for Gage 9039 in STS-2
Fig. A.29c Aerothermal Analysis for Gage 9039 in STS-3
Fig. A.29d Aerothermal Analysis for Gage 9039 in STS-4
Fig. A.29e  Aerothermal Analysis for Gage 9039 in STS-5
Fig. A.29f  Aerothermal Analysis for Gage 9039 in STS-7
Fig. A.30a  Aerothermal Analysis for Gage 9040 in STS-5
NOTE:
- Bad Heating Rate Measurements

Fig. A.30b  Aerothermal Analysis for Gage 9040 in STS-7
Fig. A.31a  Aerothermal Analysis for Gage 9041 in STS-1
Fig. A.31b  Aero thermal Analysis for Gage 9041 in STS-2
Fig. A.31c  Aerothermal Analysis for Gage 9041 in STS-3
Fig. A.31d  Aerothermal Analysis for Gage 9041 in STS-4
Fig. A.31e  Aerothermal Analysis for Gage 9041 in STS-5
Fig. A.31f  Aerothermal Analysis for GAge 9041 in STS-7
Fig. A.32a  Aerothermal Analysis for Gage 9042 in STS-1
Fig. A.32b  Aerothermal Analysis for Gage 9042 in STS-2
Fig. A.32c  Aerotherm al Analysis for Gage 9042 in STS-3
Fig. A.32d  Aerothermal Analysis for Gage 9042 in STS-4
Fig. A.32e  Aerothermal Analysis for Gage 9042 in STS-5
Fig. A.32f  Aerothermal Analysis for Gage 9042 in STS-7
Fig. A.33a  Aerothermal Analysis for Gage 9043 in STS-5
Fig. A.33b  Aerothermal Analysis for Gage 9043 in STS-7
Fig. A.34a  Aerothermal Analysis for Gage 9045 in STS-1
Fig. A.34b  Aerothermal Analysis for Gage 9045 in BTS-2
Fig. A.34c  Aerothermal Analysis for Gage 9045 in STS-3
Fig. A.34d Aerothermal Analysis for Gage 9045 in STS-4
Fig. A.34e  Aerothermal Analysis for Gage 9045 in STS-5
Fig. A.34f  Aerothermal Analysis for Gage 9045 in STS-7
Fig. A.35a  Aerothermal Analysis for Gage 9046 in STS-1
NOTE:
- Bad Heating Rate Measurements

Fig. A.35b  Aerothermal Analysis for Gage 9046 in STS-2
Fig. A.35c Aeroheating Analysis for Gage 9046 in STS-3
Fig. A.35d  Aerothermal Analysis for Gage 9046 in STS-4
Fig. A.35e  Aerothermcal Analysis for Gage 9046 in STS-5
Fig. A.35f  Aerothermal Analysis for Gage 9046 in STS-7
Fig. A.36a  Aerothermal Analysis for Gage 9047 in STS-1
Fig. A.36b  Aerothermal Analysis for Gage 9047 in STS-2
Fig. A.36c  Aerothermal Analysis for Gage 9047 in STS-3
Fig. A.36d  Aerothermal Analysis for Gage 9047 in STS-4
Fig. A.36e  Aerothermal Analysis for Gage 9047 in STS-5
Fig. A.36f  Aerothermal Analysis for Gage 9047 in STS-7
APPENDIX B

FLIGHT- DERIVED \( hi/hu \) VS. \( M_\infty \) PLOTS
Fig. B.1 Flight-derived \( \frac{h_i}{h_u} \) vs. \( M_\infty \) for Gage 9001
Fig. B.2 Flight-derived $\frac{h_i}{h_u}$ vs. $M_a$ for Gage 9004
Fig. B.4 Flight-derived $\frac{h_1}{h_{u}}$ vs. $M_{\infty}$ for Gage 9007
Fig. B.13 Flight-derived $\frac{h_i}{h_u}$ vs. $M_c$ for Gage 9017
Fig. B.14 Flight-derived $\frac{h_i}{h_u}$ vs. $M_w$ for Gage 9018
Fig. B.18 Flight-derived \( h_i/h_u \) vs. \( M_\infty \) for Gage 9022
Fig. B.23 Flight-derived $h_i/h_u$ vs. $M_\infty$ for Gage 9028
Fig. B.24 Flight-derived $h_i/h_u$ vs. $M_\infty$ for Gage 9029
Fig. B.29 Flight-derived $h_i/h_u$ vs. $M_\infty$ for Gage 9039
Fig. B.31 Flight-derived $h_i/h_u$ vs. $M_{\infty}$ for Gage 9041
Fig. B.34 Flight-derived $h_i/h_u$ vs. $M_\infty$ for Gage 9045
Fig. B.35 Flight-derived $h_i/h_u$ vs. $M_a$ for Gage 9046
Fig. B.36 Flight-derived $h_i/h_u$ vs. $M_\infty$ for Gage 9047