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Computer Program for Compressible Flow Network Analysis

A computer program, CFNA, has been developed which solves the problem of an arbitrarily connected one dimensional compressible flow network with pumping in the channels and momentum balancing at flow junctions. The program has been specifically designed to include pressure drop calculations for impingement flow and flow through pin fin arrangements, as currently found in many air cooled turbine bucket and vane cooling configurations.

The calculation part of the program consists of two major subdivisions. The first section computes the compressible pressure drop through a single passage including friction, orifice, and pumping losses. Provision is made for inlet losses, variable geometry, and pin fin arrays. The second part of the program balances flows and pressures throughout the network. This is an iterative procedure involving matrix evaluations. It converges rapidly in most instances. The program alternates between these two sections a minimum of three times, and reaches a required tolerance on percentage change of total flow before outputting results.

Notes:

1. This program is written in FORTRAN IV for use on the IBM 7094.
2. Inquiries concerning this program should be directed to:

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Reference: LEW-11859

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