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NASA TECH BRIEF

Lewis Research Center

Computer Program Calculates Transonic Velocities in Turbomachines

A computer program, called TSONIC, obtains the numerical solution for ideal, transonic, compressible flow for an axial, radial, or mixed flow cascade of turbomachinery blades. The cascade may be circular or straight (infinite), fixed or rotating. The program can be applied to the aerodynamic design of turbine rotor blades, impellers for superchargers, steam-turbine rotors, guide vanes, etc., where local supersonic flows may occur.

Two useful methods for calculating blade surface velocities are the velocity-gradient (stream-filament) method and the finite-difference method for solving the stream-function equation. However, the finite-difference method is limited strictly to subsonic flows, and the velocity-gradient method is limited to a well-guided channel. The computer program combines the velocity-gradient and finite-difference methods to extend the range of problems which can be solved. Thus, velocities in turbomachines can be calculated for local conditions where the flow might pass from subsonic to supersonic (transonic) velocity.

Notes:

1. This program is written in FORTRAN IV for use on the IBM 7094-2/7044 direct-coupled computer.
2. Requests for further information may be directed to:

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   112 Barrow Hall
   University of Georgia
   Athens, Georgia 30601
   Reference: B71-10402

Patent status:

No patent action is contemplated by NASA.

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