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NASA TECH BRIEF

Lewis Research Center

Improved Axisymmetric Potential Flow Computer Program

In recent years, the surface-source method of calculating potential flow about arbitrary bodies has been developed extensively and has proved to be a useful tool in a wide variety of low-speed design applications ranging from simple shapes to complicated inlets with centerbodies, multi-element airfoils, and wing-fuselage-pylon-nacelle combinations. The basic method has now been refined to increase substantially the accuracy of the results and to reduce the computational time. For calculating exterior flows about simple bodies and interior flow in ducts, this refinement typically yields an order of magnitude improvement in accuracy or speed. For calculating inlet flows, the effectiveness of the refined method is less dramatic, but is an improvement on the basic method.

In the basic method, body contours are approximated by straight line elements on each of which the source density is constant. The higher-order refinement consists of using curved surface elements and a source density that varies linearly over an element. The program calculates low speed flows about or within bodies of axially symmetric shape. Solid body, inlet, and purely internal flow problems can be solved. The program is capable of dealing with several bodies at once in the presence of one another, and interference problems can be treated with ease. Boundaries need not be solid; i.e., flows involving area suction can be calculated. Velocities can be computed not only for points on the body but also at discrete points in the entire flow field.

Notes:

1. This program is written in FORTRAN IV for use on the UNIVAC 1106 computer.
2. Inquiries concerning the program should be directed to:

   COSMIC
   Information Services
   112 Barrow Hall
   University of Georgia
   Athens, Georgia 30602
   Reference: LEW-12387

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