NASA TECH BRIEF

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Computation of Aerodynamic Interference Between Lifting Surfaces and Lift- and Cruise-Fans

A sequence of three computer programs has been developed for predicting aerodynamic interference on the lifting surfaces of transport-type aircraft which are equipped with lift and cruise fans; for example, a high-bypass-ratio engine and wing-pylon tail configuration or a fuselage-mounted lift-fan and wing-tail configuration.

The first program is used to calculate the singularity distributions representing the flow model of a high-bypass-ratio turbofan engine and its wake and the velocity-field induced by the singularities. The second program is used to compute the singularity distributions representing the wake of a lift fan exhausting in a crossflow; the path of the jet is predicted and the velocity-field induced by the jet is computed.

The third program utilizes a vortex-lattice lifting-surface method which can accommodate a wing with a single pylon per panel and a horizontal tail surface; externally-induced velocities can be accepted, such as those obtained from the first or second programs. At all speeds up to the critical speed of the configura-tion, the vortex-lattice program provides information about the detailed loading distributions on the wing, pylon, and tail at angles of attack below stall; gross lift- and pitching-moment coefficients may also be obtained.

Notes:
1. The programs are written in FORTRAN IV for the IBM-7094 computer.
2. Inquiries concerning the programs should be directed to:
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   Reference: ARC-10833

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under contract to
Ames Research Center
(ARC-10833)

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