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Computational Study of Axisymmetric Off-Design Nozzle Flows

By Teryn Dalbello

BiblioGov. Paperback. Book Condition: New. This item is printed on demand. Paperback. 30 pages. Dimensions: 9.7in. x 7.4in. x 0.1in. Computational Fluid Dynamics (CFD) analyses of axisymmetric circular-arc boattail nozzles operating off-design at transonic Mach numbers have been completed. These computations span the very difficult transonic flight regime with shock-induced separations and strong adverse pressure gradients. External afterbody and internal nozzle pressure distributions computed with the Wind code are compared with experimental data. A range of turbulence models were examined, including the Explicit Algebraic Stress model. Computations have been completed at freestream Mach numbers of 0.9 and 1.2, and nozzle pressure ratios (NPR) of 4 and 6. Calculations completed with variable time-stepping (steady-state) did not converge to a true steady-state solution. Calculations obtained using constant timestepping (timeaccurate) indicate less variations in flow properties compared with steady-state solutions. This failure to converge to a steady-state solution was the result of using variable time-stepping with large-scale separations present in the flow. Nevertheless, time-averaged boattail surface pressure coefficient and internal nozzle pressures show reasonable agreement with experimental data. The SST turbulence model demonstrates the best overall agreement with experimental data. This item ships from La Vergne, TN. Paperback.


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