

# Transonic integro-differential and integral equations with artificial viscosity

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## **Abstract:**

From the two-dimensional transonic small disturbance equation, with artificial viscosity, we derive an integro-differential equation and subsequently an integral equation. The computational domain is discretized into rectangular elements and functions of the dependent variable and its derivatives are assumed to be constant in each element. The resulting nonlinear algebraic systems are solved by Jacobi iteration. The method is tested for parabolic-arc and NACA0012 airfoils. Convergence is fast and the solutions compare well with finite-difference results, despite the use of a comparably small number of nodes.