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Non-Reflecting Boundary Condition for Direct Aeroacoustic Computation

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A new non-reflecting boundary condition (NSPML), based on perfectly matched layer concept applied to full compressible Navier–Stokes equations, is proposed for direct aeroacoustics computation. The boundary condition is designed to absorbs two-dimensional acoustic waves incident at all angles. The NSPML is validated with aeroacoustic flows of increasing complexity, namely a radially propagating Gaussian acoustic pulse, interaction of Gaussian pulse with a vortex in uniform flow and acoustic waves generated from an open cavity flow. In comparison with existing boundary conditions, it is found that the proposed NSPML provides higher non-reflectivity and generates significant less error waves, but at a much lower computational cost.

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