EVALUATION OF GENERAL NON-REFLECTING BOUNDARY CONDITIONS FOR INDUSTRIAL CFD APPLICATIONS.

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The importance of having proper boundary conditions for the calculation domain is a known issue in Computational Fluid Dynamics (CFD). In many situations, it is very difficult to define a correct boundary condition. The flow may enter and leave the computational domain at the same time and at the same boundary. In such circumstances, it is important that numerical implementation of boundary conditions enforces certain physical constraints leading to correct results which then ensures a better convergence rate. The aim of this paper is to evaluate recently proposed non-reflecting boundary conditions (Frolov et al., 2001, Advances in Chemical Propulsion) on industrial CFD applications. Derivation of the local non-reflecting boundary conditions at the open boundary is based on finding the solution of linearized Euler equations vanishing at infinity for both incompressible and compressible formulations. This is implemented into the in-house CFD package AVL FIRE and some numerical details will be presented as well. The key applications in this paper are from automotive industry, e.g. an external car aerodynamics, an intake port, etc. The results will show benefits of using effective non-reflecting boundary conditions.