Abstract Submitted
for the DFD08 Meeting of
The American Physical Society

Enhancement of PANS model's performance by introducing advanced numerical techniques BRANISLAV BASARA, AVL LIST GMBH — The Partially-Averaged Navier-Stokes (PANS) approach is a recently proposed method by Girimaji (2003), which changes seamlessly from RANS to the direct numerical solution of the Navier-Stokes equations (DNS) as the unresolved-to-total ratios of kinetic energy and dissipation are varied. The parameter which determines the unresolved-to-total kinetic energy ratio fk is defined based on the grid spacing. The PANS asymptotic behaviour goes smoothly from RANS to DNS with decreasing fk. In the work of Basara, Krajnovic and Girimaji (2008), it was shown that a dynamic update of the PANS key parameter fk by changing at each point and at the end of every time step is the promising approach to provide the optimum modeling on employed computational meshes. This work is extended here by introducing numerical techniques which efficiently increase a grid resolution and with that, decrease the parameter fk. This is achieved by employment of the effective non-reflecting boundary conditions and cutting computational domains, and by adaptive grids which allow keeping in advance prescribed value of the parameter fk. The results will show benefits of using the advanced numerical techniques in conjunction with PANS method.

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Date submitted: 24 Jul 2008 Electronic form version 1.4