

Abstract Submitted  
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**Quantifying numerical dissipation rate in a commercial CFD code**

GIACOMO CASTIGLIONI, J. ANDRZEJ DOMARADZKI, University of Southern California — Recently it has become increasingly clear that the role of a numerical dissipation, originating from the discretization of Navier-Stokes equations, rarely can be ignored regardless of the formal order of accuracy of a numerical scheme used in explicit or implicit Large Eddy Simulations (LES). The numerical dissipation inhibits the predictive capabilities of LES whenever it is of the same order of magnitude or larger than the subgrid-scale dissipation. The need to estimate the numerical dissipation is most pressing for lower order methods employed by commercial CFD codes. Following the recent work of Schraner et al. the equations and procedure for estimating the numerical dissipation rate and the numerical viscosity in a commercial code will be presented. The method allows to compute the numerical dissipation rate and numerical viscosity in the physical space for arbitrary sub-domains in a self-consistent way, using only information provided the code in question. It is the first time this analysis has been applied to low order solvers. Two equivalent ways to compute the numerical dissipation rate are described and compared. The procedure is tested for a 3D Taylor-Green vortex flow and compared with benchmark results obtained using an accurate, incompressible spectral solver.

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