Abstract Submitted
for the DFD15 Meeting of
The American Physical Society

Detached eddy simulation of high-Reynolds-number turbulent flows using the immersed boundary method MATTEO BERNARDINI, SERGIO PIROZZOLI, PAOLO ORLANDI, Dep. Mechanical and Aerospace Engineering University of Rome "La Sapienza" — Detached Eddy Simulation based on the Spalart-Allmaras turbulence model is applied in conjunction with the immersed boundary method to simulate high-Reynolds number turbulent flows in complex geometries. A fourth-order, finite-difference solver capable of discretely preserving the kinetic energy in the limit of inviscid flow is adopted to solve the compressible Navier-Stokes equations and model-consistent, adaptive wall functions are employed to provide the proper numerical boundary conditions at the fluid/solid interface. Numerical tests, performed for several configurations involving massively separated flows, demonstrate that computations at high-Reynolds number, as typically occurring in flows of industrial relevance, can be successfully carried out using the immersed boundary strategy, providing predictions whose accuracy is comparable to that of standard, body-fitted, structured or unstructured flow solvers.

Matteo Bernardini
Dep. Mechanical and Aerospace Engineering University of Rome "La Sapienza"

Date submitted: 01 Aug 2015 Electronic form version 1.4