Abstract Submitted
for the DFD14 Meeting of
The American Physical Society

Wavelet-based LES modeling of bluff-body flow with variable thresholding[1] GIULIANO DE STEFANO, University of Naples (Italy), ALIREZA NEJADMALAYERI, OLEG V. VASILYEV, University of Colorado Boulder — The ability to represent coherent structures have made wavelet-based methods very useful for developing multi-resolution variable fidelity approaches to the computational modeling of turbulence. Following the wavelet-based adaptive LES approach, the turbulent velocity field is decomposed into two different parts: a coherent more energetic velocity field, which is computed, and a residual less energetic coherent/incoherent one, whose effect is approximated through SGS modeling. A new space-time varying thresholding procedure that consists in tracking the wavelet thresholding parameter within a Lagrangian frame, by directly solving the corresponding evolution equation and exploiting a path-line diffusive averaging approach, is used. The method is applied to the simulation of the turbulent flow past a square cylinder, where the geometry is enforced through Brinkman volume-penalization. Wavelet-based adaptive LES supplied with the one-equation localized dynamic kinetic-energy-based model is successfully performed at moderately high Reynolds number. The present method of physics-based Lagrangian varying thresholding fully exploits the intermittency of turbulence, overcoming the major limitation for wavelet multi-resolution techniques that make use of constant and uniform thresholding.

[1]Supported by NSF under grant No. CBET-1236505

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Date submitted: 01 Aug 2014 Electronic form version 1.4