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SGS kinetic energy based dynamic models for Stochastic Coherent Adaptive Large Eddy Simulation[1] GIULIANO DE STEFANO, Seconda Universitá Napoli, Italy, OLEG V. VASILYEV, University of Colorado at Boulder, DANIEL E. GOLDSTEIN, Northwest Research Associates, Inc., CORA Division —
This is the second of two talks, which describe ongoing localized SGS model development for the Stochastic Coherent Adaptive Large Eddy Simulation (SCALES) methodology. In this talk, new localized one-equation dynamic closure models based on the subgrid-scale turbulent kinetic energy are presented. One of the main advantages of the present formulation is that the equilibrium assumption between production and dissipation of SGS kinetic energy is no longer required, since an additional transport model equation for the SGS kinetic energy is solved, together with the wavelet-filtered Navier-Stokes equations, to ensure the energy budget between resolved and unresolved motions. Both localized eddy-viscosity and dynamic structure non eddy-viscosity models are considered. Preliminary numerical experiments are conducted for freely decaying homogeneous turbulence. Good results are obtained in terms of both grid compression, that is a fundamental parameter for wavelet-based numerical solutions of turbulence, and low order flow statistics.

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