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Lagrangian dynamic SGS model for Stochastic Coherent Adaptive[1] OLEG V. VASILYEV, University of Colorado at Boulder, DANIEL E. GOLDSTEIN, Northwest Research Associates, Inc., CORA Division, GIULIANO DE STEFANO, Seconda Universitá di Napoli, Italy, NICHOLAS K.-R. KEVLAHAN, McMaster University, Canada — This is the first of two talks, which describe ongoing localized SGS model development for the Stochastic Coherent Adaptive Large Eddy Simulation (SCALES) methodology. The SCALES approach has the potential for significant improvement over regular grid LES methods with its ability to resolve and dynamically track the most energetic coherent structures in a turbulent flow through dynamic grid adaptation based on wavelet threshold filtering. In this talk we propose a new local Lagrangian pathline/tube dynamic model, as an extension of the original formulation by Meneveau *et al.* (J. Fluid Mech., 1996). The new procedure involves the definition of the following filtered averages over the trajectory of a fluid particle: $\overline{\mathcal{I}}_{LM}(\mathbf{x},t) = \frac{1}{T}\int_{-\infty}^{t} e^{\frac{\tau-t}{T}} \iiint_D G\left(\mathbf{y}-\mathbf{x}\left(\tau\right),\tau\right) L_{ij}M_{ij}\left(\mathbf{x}\left(\tau\right),\tau\right) d\mathbf{y}d\tau$, and, analogously, $\overline{\mathcal{I}}_{MM}(\mathbf{x},t)$, G being the local low-pass filter moving together with the particle. Preliminary numerical experiments are conducted for a freely decaying homogeneous turbulent flow. Good results are obtained in terms of both grid compression and low order flow statistics.

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