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Explicit Wavelet Filtering in Stochastic Coherent Adaptive Large Eddy Simulation[1] GIULIANO DE STEFANO, Seconda Universitá Napoli, Italy, OLEG V. VASILYEV, University of Colorado at Boulder — The Stochastic Coherent Adaptive Large-Eddy Simulation (SCALES) method is a novel approach to the numerical simulation of turbulence, where the coherent energetic eddies are solved while modeling the effect of the less energetic background flow. In the explicit-filtering approach, additional explicit wavelet thresholding filter is applied, along with the implicit filter induced by the use of the adaptive wavelet collocation method to solve the governing equations. Two different thresholding levels are clearly identified: the physical threshold that controls the formal separation between resolved coherent eddies and residual coherent/incoherent flow, and the numerical threshold that controls the numerical accuracy of the method. A number of numerical experiments is conducted to study the effect of the numerical thresholding level on the accuracy and computational efficiency of the SCALES method and the trade-off between modeling and numerical issues. The explicit wavelet filtering allows us to analyze the quality of SCALES solutions with respect to ideal grid-independent solutions, enhancing our knowledge about the strong interaction that exists between wavelet grid-compression and modeled turbulent dissipation.

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