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Fully adaptive LES of homogeneous turbulent flows GIULIANO DE STEFANO, Seconda Universita' di Napoli, OLEG V. VASILYEV, University of Colorado at Boulder — With the recent development of wavelet-based techniques for computational fluid dynamics, adaptive numerical simulations of turbulent flows have become feasible. Adaptive wavelet methods are based on wavelet threshold filtering that makes it possible to separate coherent energetic eddies, which are numerically resolved, from residual background flow structures that are filtered out. The prescription of a given threshold for wavelet filtering directly links to the desired turbulence resolution. A new original strategy is presented for which the wavelet filtering threshold is not prescribed a-priori but determined on the fly for a given and known level of turbulence resolution. A completely adaptive eddy capturing approach that allows to perform variable fidelity numerical simulations of homogeneous turbulent flows is proposed. The new method is based on wavelet filtering with time-dependent thresholding that automatically adapts to the actual flow conditions in order to achieve the desired level of turbulence resolution. The filtered governing equations supplemented by a localized dynamic energy-based closure model are solved by means of the adaptive wavelet collocation numerical method.

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