Wavelet-based adaptive LES with explicit-filtering. GIULIANO
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at Boulder — Wavelet-based adaptive large-eddy simulation is a novel approach
to the numerical simulation of turbulence, where the coherent energetic eddies are
solved for, while modelling the influence of the less energetic coherent/incoherent
background flow. The formal separation between resolved and unresolved turbu-
lent velocity field is obtained by wavelet threshold filtering that is inherent to the
adaptive wavelet collocation numerical method. A new explicit wavelet filtering
strategy is introduced and tested, by considering two different filtering levels: the
physical level, which controls the turbulence model, and the numerical level that
is responsible for the accuracy of numerical calculations. The theoretical basis for
wavelet-based adaptive large-eddy simulation with explicit filtering and consistent
dynamic modelling is given. Some numerical experiments are presented for unsteady
homogeneous turbulence, demonstrating the existence of grid-independent solutions.

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