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Wavelet-based adaptive LES of turbulent flow around a square-cylinder GIULIANO DE STEFANO, University of Naples (Italy), OLEG V. VASILYEV, University of Colorado Boulder — The incompressible turbulent flow around a two-dimensional bluff body with square cross-section is simulated by using a wavelet-based adaptive LES method. The presence of the obstacle is modeled with the Brinkman volume-penalization technique, which results in modifying the governing equations with the addition of an appropriate forcing term inside the spatial region occupied by the cylinder. The localized dynamic kinetic-energy-based approach (De Stefano et al., PF 2008) is utilized to model the residual stresses term in the wavelet-filtered volume-penalized incompressible Navier-Stokes equations. The filtered momentum and SGS energy equations are numerically solved by means of the adaptive wavelet collocation method, where the time-dependent non-uniform spatial grid is dynamically determined following the flow evolution. The combined volume-penalization/wavelet-collocation approach is successfully applied to the simulation of turbulent vortex shedding flow behind a stationary prism with square cross-section at moderate Reynolds number. The present results are in good agreement with both experimental findings and data from non-adaptive numerical solutions.

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