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Wavelet-based adaptive numerical simulation of unsteady 3D flow around a bluff body GIULIANO DE STEFANO, University of Naples (ITALY), OLEG VASILYEV, University of Colorado at Boulder — The unsteady three-dimensional flow past a two-dimensional bluff body is numerically simulated using a wavelet-based method. The body is modeled by exploiting the Brinkman volume-penalization method, which results in modifying the governing equations with the addition of an appropriate forcing term inside the spatial region occupied by the obstacle. The volume-penalized incompressible Navier-Stokes equations are numerically solved by means of the adaptive wavelet collocation method, where the non-uniform spatial grid is dynamically adapted to the flow evolution. The combined approach is successfully applied to the simulation of vortex shedding flow behind a stationary prism with square cross-section. The computation is conducted at transitional Reynolds numbers, where fundamental unstable three-dimensional vortical structures exist, by well-predicting the unsteady forces arising from fluid-structure interaction.

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