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A regularized vortex-particle mesh method for large eddy simulation H. J. SPIETZ, Technical University of Denmark, J. H. WALTHER, Technical University of Denmark and ETH Zurich, M. M. HEJLESEN, Technical University of Denmark — We present recent developments of the remeshed vortex particle-mesh method for simulating incompressible fluid flow. The presented method relies on a parallel higher-order FFT based solver for the Poisson equation. Arbitrary high order is achieved through regularization of singular Green's function solutions to the Poisson equation and recently we have derived novel high order solutions for a mixture of open and periodic domains. With this approach the simulated variables may formally be viewed as the approximate solution to the filtered Navier Stokes equations, hence we use the method for Large Eddy Simulation by including a dynamic subfilter-scale model based on test-filters compatible with the aforementioned regularization functions. Further the subfilter-scale model uses Lagrangian averaging, which is a natural candidate in light of the Lagrangian nature of vortex particle methods. A multiresolution variation of the method is applied to simulate the benchmark problem of the flow past a square cylinder at $Re = 22000$ and the obtained results are compared to results from the literature.

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