Abstract Submitted
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Unbounded Immersed Interface solver, also for use in Vortex Particle-Mesh methods YVES MARICHAL[1], PHILIPPE CHATELAIN, GREGOIRE WINCKELMANS, Universite catholique de Louvain (UCL), Institute of Mechanics, Materials and Civil Engineering (iMMC) — We present a new and efficient algorithm to solve the 2-D Poisson equation in unbounded domain and with complex inner boundaries. It is based on an efficient combination of two components: the Immersed Interface method to enforce the boundary condition on each inner boundary (here using solely 1-D stencil corrections) and the James-Lackner algorithm to compute the outer boundary condition consistent with the unbounded domain solution. The algorithm is here implemented using second order finite differences and is particularized to the computation of potential flow past solid bodies. It is validated, by means of grid convergence studies, on the flow past multiple bodies (some also with circulation). The results confirm the second order accuracy everywhere. The algorithm is self consistent as "all is done on the grid" (thus without using a Vortex Panel boundary element method in addition to the grid). The next aim of this work is then to integrate this algorithm in the Vortex Particle-Mesh (VPM) method for the computation of unsteady viscous flows, with boundary layers, detached shear layers and wakes. Preliminary results of the combined methods will also be presented.

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