**Vortex-Body Interaction using a Level-Set Based Overset Grid Method**[1] SIMTHA RENJITHAM, JEFFREY MARSHALL, University of Vermont — An overset grid method is presented for solution of the integral vorticity-velocity formulation of the Navier-Stokes equations. The method uses an inner body-fitted grid and an outer Cartesian grid. The Biot-Savart integral is solved using an adaptive, optimized multipole acceleration method. The integration is performed over all inner grid cells, over all "active cells" of the outer grid that lie entirely outside of the inner grid, and over sub-elements of a set of overhanging cells of the outer grid that overlap part of the inner grid. A level-set function is introduced in which the zero level-set curve coincides with the outer surface of the inner grid. This level-set function is used to rapidly subdivide the overhanging grid cells into triangular sub-cells which lie entirely outside of the inner grid, while omitting the parts of these cells that lie inside the inner grid, so as to avoid double-counting the vorticity in these regions. The pressure is solved as a post-processing variable using a boundary-element formation that requires evaluation of an integral using a parallel method to that used for velocity calculation. The method is applied to two-dimensional flow past stationary and moving bodies, and it is well suited to vortex-body interaction with complex, moving bodies.

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