1032-76-187 **Tim Colonius*** (colonius@caltech.edu), Mail code 104-44, Caltech, Pasadena, CA 91125, and **Kunihiko Taira** (kunihiko@caltech.edu), Mail Code 104-44, Caltech, Pasadena, CA 91125. *A multi-domain approach for far-field boundary conditions in incompressible flow.*

A multi-domain technique is developed in order to improve far-field boundary conditions to account for the extensive potential flow induced by three-dimensional incompressible flow about arbitrary bodies, as well as vorticity that advects/diffuses to large distance from the body. The vorticity is interpolated to a series of larger, but coarser meshes, and simple zero-streamfunction boundary conditions are applied on the largest mesh. Then the vorticity/streamfunction Poisson equation is solved via the FFT with zero boundary conditions on the largest mesh, and boundary conditions on the smaller meshes are interpolated from the solutions on the larger meshes. Interpolation operators preserve circulation so that the coarsened vorticity induces the correct velocity, to first order, on the smallest mesh. The technique is validated by comparing to the exact solutions for the potential flow induced by stationary and propagating Oseen vortices and by an impulsively-started circular cylinder. When combined with an immersed-boundary method, the technique allows very fast solution of flow (at low to moderate Reynolds number) around arbitrary three-dimensional bodies. (Received August 21, 2007)