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An Iterative Brinkman penalization for particle vortex methods J.H. WALTHER, M.M. HEJLESEN, Technical University of Denmark, A. LEONARD, California Institute of Technology, P. KOUMOUTSAKOS, ETH Zurich — We present an iterative Brinkman penalization method for the enforcement of the no-slip boundary condition in vortex particle methods. This is achieved by implementing a penalization of the velocity field using iteration of the penalized vorticity. We show that using the conventional Brinkman penalization method can result in an insufficient enforcement of solid boundaries. The specific problems of the conventional penalization method is discussed and three examples are presented by which the method in its current form has shown to be insufficient to consistently enforce the no-slip boundary condition. These are: the impulsively started flow past a cylinder, the impulsively started flow normal to a flat plate, and the uniformly accelerated flow normal to a flat plate. The iterative penalization algorithm is shown to give significantly improved results compared to the conventional penalization method for each of the presented flow cases.

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