

The Fictitious Domain Method for Incompressible Viscous Flow around Obstacles with Navier Slip Boundary Condition

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The fictitious domain method is an effective method for simulating flow-body interaction. The method was developed by Glowinski for simulating the particulate flow with no slip boundary condition. In many applications, fluid slip at the solid surface becomes important. The generalization of the fictitious domain method to slip boundary condition is not trivial. As a step in this direction, we discuss a new least-square/fictitious domain method for Navier-Stokes problem with slip boundary conditions. The method is of the virtual control type and relies on a least-squares formulation making the problem solvable by a conjugate gradient algorithm operating in a well chosen control space. Numerical results are presented. This is a joint work with R. Glowinski and XP Wang.