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Numerical simulation and optimal shape for viscous flow by a fictitious domain method.
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Summary: We discuss the fictitious domain solution of the Navier-Stokes equations modelling unsteady incompressible viscous flow. The method is based on a Lagrange multiplier treatment of the boundary conditions to be satisfied and is particularly well suited to the treatment of no-slip boundary conditions. This approach allows the use of structured meshes and fast specialized solvers for problems on complicated geometries. Another interesting feature of the fictitious domain approach is that it allows the solution of optimal shape problems without regriding. The resulting methodology is applied to the solution of flow problems including external incompressible viscous flow modelled by the Navier-Stokes equations and then to an optimal shape problem for Stokes and Navier-Stokes flow.

MSC:

[76M30](#) Variational methods applied to problems in fluid mechanics
[76M10](#) Finite element methods applied to problems in fluid mechanics
[76D05](#) Navier-Stokes equations for incompressible viscous fluids
[76D07](#) Stokes and related (Oseen, etc.) flows

Cited in **21** Documents

Keywords:

[Lagrange multipliers](#); [external flow](#); [no-slip boundary conditions](#)

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