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Section:

17. Control Theory and Optimization

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Shape Optimization for Navier-Stokes Equations by an Embedding Domain Technique
Shape optimization problems for the two-dimensional stationary Navier-Stokes equations are studied. An embedding domain technique which provides an equivalent formulation of the problem on a fixed domain is introduced. Existence of a solution to the domain optimization problem and Fréchet differentiability with respect to the variation of the domain of cost functionals of tracking type for the velocity field are proved. A simply computable formula for the gradient of the cost functional is derived. Numerical examples show the advantages of the embedding domain technique and the reliability of the gradient formula.