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Optimization of the protrusion shape for a couette-type flow

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Abstract

A study is made of the longitudinal 2D viscous steady flow and heat flux between two plates. Optimal shape design problems are solved in explicit form and shown to have unique global extrema. Conformal mappings are used to bring the problems into a fixed domain and solve them as Dirichlet boundary value problems in the form of Cauchy integrals and series expansions. For the simplest problem statement the optimum is shown to coincide with the well-known concrete dam outline of constant hydraulic gradient.
