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On a method for computing steady plane viscous motion in multiply-connected domains.
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Summary: A new method for determination of steady plane motion of incompressible viscous liquid in multiply-connected domains is presented. The method is based on integration of a quasi-linear fourth-order equation for the stream function, as well as on conformal mapping of a multiply-connected original domain onto a multiply-connected region bounded by circles. The transformed problem governed by the equation for the stream function is solved by means of an analytically-numerical method, the stream function being assumed in form of suitable series in functions relating to a generalization of the Goursat formula. Determination of the unknown coefficients of the series is reduced to a system of linear equations, resulting from the boundary conditions, as well as from collocation conditions at fixed points of the domain of solution.

MSC:

76D10 Boundary-layer theory, separation and reattachment, higher-order effects
35Q30 Navier-Stokes equations

Keywords:
steady plane motion; incompressible viscous liquid; multiply-connected domains; quasi-linear fourth-order equation for the stream function; Goursat formula