

Solution of Leray's problem for stationary Navier-Stokes equations in plane domains

Mikhail V. Korobkov

Sobolev Institute of Mathematics, Acad. Koptyug pr. 4, and Novosibirsk State University, Russia

korob@math.nsc.ru

Konstantin Pileckas

Faculty of Mathematics and Informatics, Vilnius University, Lithuania

konstantinas.pileckas@mif.vu.lt

Remigio Russo

Department of Mathematics and Physics, Second University of Naples, Italy

remigio.russo@unina2.it

We study the nonhomogeneous boundary value problem for the Navier-Stokes equations of steady motion of a viscous incompressible fluid in arbitrary bounded multiply connected plane domains. We prove that this problem has a solution under the sole necessary condition of zero total flux through the boundary. The problem was formulated by Jean Leray 80 years ago. The proof of the main result uses Bernoulli's law for a weak solution to the Euler equations and level sets of Sobolev functions.