Generalized and strong solutions for Stokes and Navier-Stokes equations with mixed boundary conditions

Imane Boussetouan[1], Chérif Amrouche[2], Nour Seloula[3]

SUMMARY

In this work, we consider Stokes and Navier-Stokes equations with mixed boundary conditions involving Dirichlet and Navier-type boundary condition. We prove the existence and uniqueness of weak and strong solutions of the Stokes problem in the Hilbert setting. Then, we investigate some regularity results in L^p-theory. We establish the existence and uniqueness of the solution in $\mathbf{W}^{1,p}(\Omega)$ for any $1 < p < +\infty$ using a duality argument. We also provide a strong regularity result in $\mathbf{W}^{2,p}(\Omega)$. Finally, we extend the obtained results to the stationary Navier-Stokes system by using some classical arguments.

Keywords: Navier-Stokes equation, Navier-type boundary condition, mixed boundary conditions, L^p theory

AMS Classification: 35J05, 76D03

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[1]National Higher School of Technology and Engineering, Annaba, Algeria
 email: `i.boussetouan@ensti-annaba.dz`

[2]University of Pau and Pays de l'Adour, France
 email: `cherif.amrouche@univ-pau.fr`

[3]University of Caen Normandie, France
 email: `nour-elhouda.seloula@unicaen.fr`