

On Stokes and Navier-Stokes equations with Navier and Dirichlet boundary conditions

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SUMMARY

In this work, we consider two types of mixed boundary conditions associated to the Stokes and Navier-Stokes systems. Firstly, we study the Stokes equation with Dirichlet boundary condition on some part of the boundary and Navier-type boundary condition on the remaining part [3]. We prove the existence and uniqueness of weak and strong solutions of the corresponding problem in the Hilbert setting [1]. Then, we generalize our solutions to the L^p -theory, by means of a bootstrap argument. Secondly, we assume that the non-homogeneous Navier boundary condition is prescribed on one part of the boundary and Dirichlet boundary condition on the other part. We prove the existence and uniqueness of the solution in $\mathbf{W}^{1,p}(\Omega)$ and $\mathbf{W}^{2,p}(\Omega)$ by taking into account the regularity of the friction coefficient, considered as a function [2]. Finally, we extend the obtained results to the stationary Navier-Stokes system by using some classical arguments.

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

AMS Classification: 35J05, 76D03

References

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