

# Stokes and Navier-Stokes equations with mixed Dirichlet and Navier boundary conditions

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We consider two types of mixed boundary conditions associated to the Stokes and Navier-Stokes equations. We study the Stokes equation with Dirichlet boundary condition on some part of the boundary and Navier-type boundary condition on the remaining part. We prove the existence and uniqueness of weak and strong solutions of the corresponding problem in the Hilbert setting and then in  $L^p$ -theory for any  $1 < p < +\infty$ . Next, we assume that the full Navier boundary condition is prescribed on one part of the boundary and Dirichlet boundary condition on the other part. We investigate the generalized and strong solutions for the given system by taking into account the regularity of the friction coefficient, considered as a function. Finally, we extend the obtained results to the stationary Navier-Stokes system by using some classical arguments.

This is a joint work with Imane Boussetouan from the Ecole Supérieure de Technologies Industrielles, Annaba, Algeria.

## References

- [1] C. AMROUCHE AND I. BOUSSETOUAN. Vector potentials with mixed boundary conditions. Application to the Stokes problem with pressure and Navier-type boundary conditions. *SIAM J. Math. Anal.*, **53-2**, (2021), 1745–1784.
- [2] P. ACEVEDO, C. AMROUCHE, C. CONCA AND A. GHOSH. Stokes and Navier-Stokes equations with Navier boundary condition. *J. Diff. Equations*, **285**, (2021), 258–320.