

Solutions of the divergence and analysis of the Stokes equations

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In this talk we present some results on the analysis of the Stokes equations which model the displacement of an incompressible viscous fluid.

First, we recall the variational analysis which allows to prove the well posedness of the Stokes equations in bounded Lipschitz domains. The main tool to obtain this result is the so called inf-sup condition, which is related to the existence of solutions of the divergence in appropriate Sobolev spaces.

In the second part of the talk we show some simple examples of non-Lipschitz domains (namely, cuspidal domains) where the standard inf-sup condition is not valid. Moreover, we show that, in these domains, the Stokes equations are not well posed in the standard Sobolev spaces. Finally, we show how the variational analysis can be generalized to prove the well posedness of the Stokes equations in cuspidal domains in appropriate weighted Sobolev spaces.