

On a non-stationary fluid flow problem in an infinite periodic pipe

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Abstract

We study a linearized non-stationary incompressible Navier-Stokes problem

$$\partial_t \mathbf{u} - \nu \Delta \mathbf{u} + (\mathbf{U} \cdot \nabla) \mathbf{u} + \nabla p = \mathbf{f}$$

with prescribed flux in a two or three dimensional L-periodic "with respect to the x_n -axis" pipe. We look for the pressure $p(x, t)$ having the following form

$$p(x, t) = -q(t)x_n + p_0(t) + \tilde{p}(x, t),$$

where $p_0(t)$ is an arbitrary function, $\tilde{p}(x, t)$ is a L-periodic function and $q(t)$ is associated to the flux condition. We will also focus on the asymptotic behavior in an infinite periodic pipe. (Joint work with M. Chipot (University of Zurich, Switzerland), N. Klovieniè (Vilnius University, Lithuania) and K. Pileckas (Vilnius University, Lithuania).)

Keywords: Linearized non-stationary Navier-Stokes type system, periodic pipe flow, flux condition, infinite domain

References

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