

## CMM PDE Seminar

**Speaker:** Gianmarco Sperone, Pontificia Universidad Católica de Chile.

**Title:** "The steady Navier-Stokes equations in a system of unbounded channels with sources and sinks"

**Abstract:** The steady motion of a viscous incompressible fluid in a junction of unbounded channels with sources and sinks is modeled through the Navier-Stokes equations under inhomogeneous Dirichlet boundary conditions. In contrast to many previous works, the domain is not assumed to be simply-connected and the fluxes are not assumed to be small. In this very general setting, we prove the existence of a solution with a uniformly bounded Dirichlet integral in every compact subset. This is a generalization of the classical Ladyzhenskaya–Solonnikov result obtained under the additional assumption of zero boundary conditions. For small data of the problem we also prove the unique solvability and attainability of Couette-Poiseuille flows at infinity. The main novelty of our approach is the proof of the corresponding Leray-Hopf inequality by Leray's *reductio ad absurdum* argument. For this contradiction approach, we use some fine properties of weak solutions to the Euler system based on Morse–Sard-type theorems in Sobolev spaces obtained by Bourgain, Korobkov & Kristensen.

This is a joint work with Filippo Gazzola (Politecnico di Milano), Mikhail V. Korobkov (Fudan University in Shanghai and Sobolev Institute of Mathematics, Siberian Branch of the Russian Academy of Sciences) and Xiao Ren (Fudan University in Shanghai).

The talk will be held in person:

**Venue:** DIM seminar room, Beauchef 851, 5th floor.

Also via zoom:

Zoom: <https://uchile.zoom.us/j/93613339766?pwd=vB3J7Vhb0EX3kQDHfH741CKN19YKQz.1>

**Friday, May 30th at 12:10 pm.**

For further information, see our webpage: <https://eventos.cmm.uchile.cl/pdeseminar/>