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CMM PDE Seminar

Speaker: Gianmarco Sperona (Politecnico di Milano, Italia)

Title: Steady-state Navier-Stokes flow in an obstructed pipe under mixed boundary conditions and with a prescribed transversal flux rate.

Abstract: The steady motion of a viscous incompressible fluid in an obstructed finite pipe is modeled through the Navier-Stokes equations with mixed boundary conditions involving the Bernoulli pressure and the tangential velocity on the inlet and outlet of the tube, while a transversal flux rate F is prescribed along the pipe. Existence of a weak solution to such Navier-Stokes system is proved without any restriction on the data by means of the Leray-Schauder Principle, in which the required a priori estimate is obtained by a contradiction argument based on Bernoulli's law. Through variational techniques and with the use of an exact flux carrier, an explicit upper bound on F (in terms of the viscosity, diameter and length of the tube) ensuring the uniqueness of such weak solution is given. This upper bound is shown to converge to zero at a given rate as the length of the pipe goes to infinity. In an axially symmetric framework, we also prove the existence of a weak solution displaying rotational symmetry.

Venue: Online via Zoom / Sala de Seminarios, 5th floor, Beauchef 851

Monday, May 22, 2023 at 12 Santiago time

El link para zoom:
https://reuna.zoom.us/j/82640308335?pwd=Y0taOTVrbEVma2dHNVAzTjRUYThmdz09

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