

SEMINÁRIO DE MECÂNICA

Magnetic fluid pipe flow under the influence of a steady magnetic field: theoretical and experimental approaches

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Abstract. The present work aims to investigate the flow of a magnetic fluid in axial symmetry through both theoretical and experimental approaches. The experiments are performed by means of a capillary tube flow, installed in a syringe pump experimental setup at low Reynolds number. The proposed theoretical models are investigated with a perturbation method based on a regular asymptotic solution, as well as numerical integration. The equations are made dimensionless in order to identify the physical dimensionless numbers such as the Péclet number, the particle volume fraction and the dimensionless parameter of effective applied magnetic field. The theoretical and experimental results are compared by means of the velocity and magnetization profiles, as well as more global quantities such as the wall viscosity and the relative viscosity.