
Registration Seminar

Seminar Title	: Numerical Investigation of Viscoelastic Fluid Flow over an Elliptical Cylinder in Laminar Flow Regime
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Venue	: New Seminar Hall, Department of Chemical engineering
Date and Time	: 23 Dec 2024 (11.00 AM)
Abstract	: There is a class of industrially essential materials (rubbers, polymers, and their derivatives) that show a blend of &ldquoviscous&rdquo fluid-like and &ldquoelastic&rdquo solid-like features, thereby giving rise to the so-called viscoelastic or elastic-viscous fluid behavior. While considerable studies exist on Newtonian and non-Newtonian fluids around circular and other cylindrical shapes, there is a lack of understanding of viscoelastic fluid flow over an elliptical cylinder. The present study considers the flow and heat transfer around an elliptic cylinder for viscoelastic fluids. Preliminary results for viscoelastic fluid flow over a circular cylinder are presented here. The flow governing equations have been solved by RheoTool, an open-source toolbox based on OpenFOAM. The work aims to study the effect of fluid behavior along with Reynold's number, Deborah's number, and solvent viscosity. The engineering parameters like drag coefficient and streamlined patterns in the vicinity of the cylinder illustrating the wake formation and vortex shedding are presented for ranges of Deborah numbers ($De = 0.05, 1.50$) and the solvent viscosity ratio ($\beta = 0.2, 0.9$). The findings aim to enhance the current understanding of viscoelastic fluid behavior around elliptical cylinders, providing valuable insights for industrial applications involving complex fluid dynamics.