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Recovery of viscoelastic turbulent pipeflow past square bar roughness¹ SHUBHAM GOSWAMI, ARMAN HEMMATI, University of Alberta — High molecular weight polymers are typically used in turbulent flows to reduce stresses and damp out turbulence (Ptasinski *et. al.*, 2001). This is particularly important in crude oil and sewage pipelines, in which the non-Newtonian viscoelastic characteristics lead to drag reduction (Burger *et. al.*, 1982 and sellin, 1978). In this study, the response and recovery of viscoelastic flow past square bar roughness are examined for Newtonian (base-flow) and viscoelastic fluids using Direct Numerical Simulations and FENE-P model, at $Re=5000-10000$. The roughness elements have a height of $h/D = 0.05$ and 0.1 , where D is the pipe diameter. Preliminary results show a reduction in the reattachment length, as well as a significant drop in near-wall stresses with the addition of polymers. The recovery by viscoelastic fluid is significantly faster compared to the base flow. Moreover, the flow unsteadiness is greatly impacted by the viscoelastic damping of flow instabilities past the roughness element. We aim to expand this study by properly identifying the behaviour of viscoelastic fluid flow and influence of elasto-inertial turbulence on the wake dynamics of pipeflows.

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