Invited Talk-04

Alteration in Membrane-based Pumping Flow with Shear-thinning and Shear-thickening Behaviours of the Fluids

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A B S T R A C T

Membrane-based pumping flow model is presented to investigate that how it will work with changing the shear-thinning and shear-thickening behaviours of the fluids. Carreau fluid model is considered for the rheological behaviour of the fluids like pseudoplastic (shear-thinning), Newtonian, and dilatant (shear-thickening) nature of the fluids based on the flow behaviour index. Velocity slip condition is adopted for this model to discuss the possibility of fluid velocity at the wall. The perturbation method is employed to derive the series solution for the governing equations subjected to physical boundary conditions with suitable assumptions. My talk will cover the results on pressure distribution, velocity field, and wall shear stress with the shear-thinning and shear-thickening nature of the fluids and Weissenberg. This model provides a framework for estimating the effects of rheological properties and velocity slip, and also aids in comprehending the role of the smart pumping mechanism applied in various needs in fields of biomedical engineering and fluid industries.

Keywords: Pseudoplastic fluid, perturbation method, rheology, Carreau fluid.