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Biofluid dynamics of two phase stratified flow through flexible membranes. DINESH BHAGAVATULA NVSSR, PUSHPAVANAM S, None — Two phase stratified flows between flexible membranes arise in biological flows like lung airway reopening, blood flow in arteries and movement of spinal cord. It is important to understand the physics behind the interaction of flexible membranes and the fluid flow. In this work, a theoretical model is developed and different types of instabilities that arise due to the fluid flow are understood. The solid membrane is modeled as an incompressible linear viscoelastic solid. To simplify the analysis, inertia in the solid is neglected. Linear stability analysis is carried around the base state velocity of the fluid and displacement field of the solid. The flow is perturbed by a small disturbance and a normal mode analysis is carried out to study the growth rate of the disturbance. An eigenvalue problem in formulated using Chebyshev spectral method and is solved to obtain the growth rate of the disturbance. The effect of different parameters such as thickness of the flexible membrane, Reynolds number, viscosity ratio, density ratio, Capillary number and Weissenberg number on the stability characteristics of the flow is studied in detail. Dispersion curves are obtained which explain the stability of the flow. A detail energy analysis is carried out to determine different ways through which energy transfers from the base flow to the disturbed flow.

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None

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