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**Dynamics and Stability of Thin Film on a porous inclined plane**
USHA RANGANATHAN, Department of Mathematics, IIITM, Chennai, India, MOHAMMED RIZWAN SADIQ, IITM, Chennai, India — The flow of a thin viscous incompressible film on a porous inclined plane is considered. The long wave theory is applied and an evolution equation for the film thickness is obtained. It is assumed that the flow through the porous medium is governed by Darcy's law. The characteristic length scale of the pore space is much smaller than the depth of the fluid layer on the inclined plane. The critical condition for the onset of instability is obtained. The results of the linear stability analysis reveal that the film flow system on a porous inclined plane is more unstable than on a rigid wall. The increase of permeability of the porous medium enhances the destabilizing effect. The existence of both supercritical stable and subcritical unstable states is established through the weakly nonlinear stability analysis. The nonlinear waves in the supercritical stable region are captured numerically. The solutions exhibit different kinds of typical waves such as nearly sinusoidal and solitary waves at long times. The shape and amplitude of such waves are strongly influenced by the permeability of the porous wall. Further the steady state solution profiles are determined for various values of the permeability parameter.

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