

Falling liquid films

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Abstrak

Falling liquid films gives a detailed review of state-of-the-art theoretical, analytical and numerical methodologies, for the analysis of dissipative wave dynamics and pattern formation on the surface of a film falling down a planar inclined substrate. This prototype is an open-flow hydrodynamic instability, that represents an excellent paradigm for the study of complexity in active nonlinear media with energy supply, dissipation and dispersion. It will also be of use for a more general understanding of specific events characterizing the transition to spatio-temporal chaos and weak/dissipative turbulence. Particular emphasis is given to low-dimensional approximations for such flows through a hierarchy of modeling approaches, including equations of the boundary-layer type, averaged formulations based on weighted residuals approaches and long-wave expansions. Whenever possible the link between theory and experiment is illustrated, and, as a further bridge between the two, the development of order-of-magnitude estimates and scaling arguments is used to facilitate the understanding of basic, underlying physics.