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Film falling on a porous substrate[1] ARGHYA SAMANTA, CHRISTIAN RUYER-QUIL, Université Pierre et Marie Curie (UPMC), BENOÎT GOYEAU, Ecole Centrale Paris, FAST CNRS UMR 7608 TEAM, EM2C CNRS UPR 288 TEAM — Consider a two dimensional viscous incompressible liquid film falling on a saturated porous inclined plane. The interface between the liquid and porous medium is modeled using a one-domain approach for which the permeability and porosity varies continuously. A two-equation model is derived in terms of the flow rate $q(x,t)$ and total height $H(x,t)$ within the framework of boundary layer approximations using weighted residual techniques. Coefficients of the model are expressed in terms of combinations of the integrals of the base flow f and weight function w that are determined numerically to ensure consistency of the approach at first order in the film parameter. The influence of properties of the homogeneous porous substrate on the wave dynamics is investigated by constructing the nonlinear traveling wave solutions.

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