Abstract Submitted
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Turbulent gas – laminar liquid flows DMITRI TSELUIKO, SERAFIM KALLIADASIS, Department of Chemical Engineering, Imperial College London, UK — We study two-dimensional co-current and counter-current turbulent gas-laminar liquid flows. Specifically, we consider a liquid film flowing under gravity down the lower wall of an inclined channel when a turbulent gas flows above it. The solution of the full system of equations describing the gas-liquid flow faces serious technical difficulties. However, a number of certain assumptions allow separating the gas problem and solving it independently. This permits finding perturbations to pressure and tangential stresses at the interface. We then proceed to the liquid problem and derive model equations describing the dynamics of the interface, i.e. boundary-layer equations, an integral-boundary-layer model and a long-wave model and we analyze solutions of these equations. As the simplest prototype retaining all the important physical mechanisms, we derive a weakly nonlinear model, a Kuramoto-Sivashinsky-type equation with a dispersive term and a contribution from the turbulent gas.

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