

Abstract Submitted
for the DFD17 Meeting of
The American Physical Society

Modelling a transitional falling liquid films¹ SANGHASHRI MUKHOPADHYAY, MARX CHHAY, CHRISTIAN RUYER-QUIL, Université Savoie Mont-Blanc, LOCIE TEAM — Liquid film plate exchangers are state-of-the-art technical solutions for the mass or heat transfer between a liquid and a gas whenever pressure drop in the gas phase is critical, for instance, evaporators. Operating conditions generally correspond to the wavy regime of the film with a Reynolds number in the range 100 to 1000, in which case turbulent spots may be observed at the front of the most prominent waves (see Adomeit et al. *Int. J. Multiphase Flow* (2000)). In this paper, we present a new model of falling liquid film accounting for the possible presence of turbulent spots. The proposed approach is based on the zero-equation model of turbulence (van Driest hypothesis) and the weighted residual technique. The obtained model is consistent up to second order with respect to the film parameter for diffusion terms. The model enables to reproduce convincingly most of the features of the roll waves observed by Brock (*J. Hydraulics Div.* 1970) at large Reynolds number. The influence of the turbulence-induced diffusion on the wave characteristics is discussed.

¹Support from Institut Universitaire de France is acknowledged

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Date submitted: 26 Jul 2017

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