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Flow transition behavior between the film flow and rivulet flow on an inclined wall YOSHIYUKI ISO, IHI Inc., XI CHEN, Columbia University — Gas-liquid two-phase flows on the wall like liquid film flows, which are the so-called wetted wall flows, are observed in many industrial processes such as absorption, desorption, distillation and others. For the optimum design of packed columns widely used in those kind of processes, the accurate predictions of the wetted wall flow behavior in packing elements are important, especially in order to enhance the mass transfer between the gas and liquid and to prevent flooding and channeling of the liquid flow. The present study focused on the effects of the change of liquid flow rate and the wall surface texture treatments on the characteristics of wetted wall flows which have the drastic flow transition between the film flow and rivulet flow. In this paper, gas-liquid two-phase flow simulation by using the volume of fluid (VOF) model is applied into wetted wall flows. Firstly, present results showed that the hysteresis of the flow transition between the film flow and rivulet flow arose against the increasing or decreasing stages of the liquid flow rate. It was supposed that this transition phenomenon depends on the history of flow pattern as the change of curvature of interphase surface which leads to the surface tension. Secondary, the present simulations showed that surface texture treatments added on the wall can improve the prevention of liquid channeling and can increase the wetted area.

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