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On barodiffusion in thin binary falling fluid films ZACHARY BORDEN, Franklin W. Olin College of Engineering, HERVE GRANDJEAN, Universite Pierre Marie Curie, A.E. HOSOI, MIT, L. KONDIC, NJIT, B.S. TILLEY, Franklin W. Olin College of Engineering — We examine interfacial dynamics of an isothermal, binary liquid thin film flowing down an inclined plane. The two fluids are incompressible with different bulk densities. Using a water-glycerol mixture, transient interfacial depressions, or "dimples," are observed. These depressions appear only for a range of water concentrations from 30% to 70% by volume, and the frequency of their appearance is inversely proportional to the characteristic film thickness. To understand the origin of these dimples, we propose a barodiffusive model of quasi-incompressible components. The coupled set of evolution equations describes the interfacial shape and the local mass concentration of one component. The model incorporates the effects of inertia, solutalcapillarity, surface tension, and barodiffusion. We find that interfacial gradients cause a slight component segregation leading to Marangoni-driven instabilities. Comparison of this model to experimental data is presented.

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