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Effects of surfactant and electrolyte on the drainage of the thin liquid film between a glass plate and a bubble approaching at a constant velocity SAORI SHIMOYAMA, TOSHIYUKI OGASAWARA, HIROYUKI TAKAHIRA, Dept. of Mechanical Engineering, Osaka Prefecture University, FLUID ENGINEERING LABORATORY TEAM — The drainage process of the thin liquid film between a glass plate and a bubble in the presence of impurities in water has been investigated experimentally. An electrolyte solution and a surfactant solution are produced by the addition of $MgSO_4$ and Triton X-100 into super purified water, respectively. The hemispherical bubble is generated at a tip of a pipe and translates toward the flat glass surface at constant approaching velocities ranging from 1 μm/s to 5000 μm/s. The thickness distribution of the liquid film formed between two surfaces is measured by the laser interferometer and fringe patterns are recorded by a high-speed video camera. In 0.05 M Triton X-100 solution, the bubble surface becomes no-slip condition due to the Marangoni effect, which delays the film drainage. Hence, deeper dimple shape is formed even at lower approaching velocities less than 1000 μm/s. On the other hands, in super purified water and 0.5 M $MgSO_4$ solution, the film does not form clear dimple shape and ruptures in the early stage of the interaction at lower approaching velocities. However, as the approaching velocity increases, the dimple shape becomes deeper and wider in $MgSO_4$ solution than that in super purified water although the bubble surfaces are free-slip condition in both cases.

Saori Shimoyama
Dept. of Mechanical Engineering, Osaka Prefecture University

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