

Abstract Submitted
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Interfacial instability in an azimuthally oscillatory two-layer fluid of oil and water¹ LINFENG PIAO, HYUNGMIN PARK, Seoul National University — There are interfacial instabilities occurring in multi-layer flows, which are of practical importance in many industrial processes, such as coating, solvent extraction and oil recovery. Especially, these instabilities could be significantly influenced by the external perturbation, e.g., oscillating forcing. In this study, we present experimental results concerning the stability of oscillatory two-layer fluid in a vertical cylinder vessel, using a high-speed imaging. Two immiscible fluids (oil and water) with a relatively low viscosity contrast (~ 100), are superposed in the vessel and the oscillating frequency and angular amplitude are varied by 0.1-7.0 Hz and 45-180 degrees, respectively. We measure the evolution of the oil-water interface during the oscillation and identify different interfacial phenomena such as interfacial vibration (like a vibration of a circular membrane), interfacial waves and initial formation of droplets. By processing the acquired images, we characterize these interfacial phenomena and investigate the effect of imposed conditions theoretically. The effect of viscosity contrast on the onset of the interfacial phenomena will be discussed additionally.

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