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Vortex-Induced Waves in Two-Phase Liquid-Liquid Flows past Bluff Body[1] M. I. I. ZAINAL ABIDIN, KYEONG H. PARK, PANAGIOTA ANGELI, Thames Multiphase, Department of Chemical Engineering, University College London, WC1E 7JE, UK, ZHIHUA XIE, LYES KAHOUADJI, OMAR K. MATAR, Department of Chemical Engineering, Imperial College London, London SW7 2AZ, UK. — Transverse cylinders of various sizes are used to generate vortex-induced interfacial waves in two-phase oil-water flows and to influence flow pattern transitions. The vortex shedding properties at different cylinder sizes and the resulting induced waves are studied experimentally with Particle Image Velocimetry (PIV) and high-speed imaging. The system consists of a 7 m long horizontal 37 mm ID acrylic pipe and different cylinders with diameters of 2, 5 and 8 mm, located in the water phase, 460 mm after the two phases come into contact. The cylinder generates waves with frequencies similar to the von Karman vortices and changes in vortex shedding properties at different cylinder size are reflected on the resulting interfacial wave characteristics. The presence of the transverse cylinder actuates the transition from stratified to dispersed flows; the boundary between the two patterns is shifted to lower mixture velocity with increasing cylinder size. Three-dimensional numerical simulation of the system is developed to assist in designing new system.

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