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Liquid-liquid flow past a bluff body[1] KYEONG H. PARK, M.I.I. ZAINAL ABIDIN, PANAGIOTA ANGELI[2], Department of Chemical Engineering, University College London, Torrington Place, London WC1E 7JE, UK, LYES KAHOUADJI, ZHIHUA XIE, OMAR K. MATAR, Department of Chemical Engineering, Imperial College London, South Kensington Campus, London SW7 2AZ, UK, CHRISTOPHER C. PAIN, Applied Modelling and Computation Group, Department of Earth Science and Engineering, Imperial College London, South Kensington Campus, London SW7 2AZ — The generation of instabilities behind a bluff body bounded by a pipe wall and its effects on flow pattern transitions from separated to dispersed oil-water flows are studied. A cylindrical bluff body is located in the water phase and the transverse direction of the flow. Investigations are conducted for flow rates that result in stratified flow in the absence of the bluff body. A high-speed camera is used to track the interfacial waves while the velocity profile in the water phase is determined by PIV. Numerical studies on single-phase flow assist in designing new bluff bodies. The results showed that the choice of the bluff body and its location generated vortices with frequencies similar to unbounded flows that corresponded to Strouhal number of 0.2. In two-phase flows, the bluff body generates waves with frequencies similar to the von Kármán vortices in the water phase behind the cylinder. The formation of the waves depended on the distance of the bluff body from the oil-water interface.

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