

Abstract Submitted
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Laser imaging in liquid-liquid flows¹ M.I.I. ZAINAL ABIDIN, KYEONG H. PARK, VICTOR VOULGAROPOULOS, MAXIME CHINAUD, PANAGIOTA ANGELI, Department of Chemical Engineering, University College London, Torrington Place, London WC1E 7JE, UK — In this work, the flow patterns formed during the horizontal flow of two immiscible liquids are studied. The pipe is made from acrylic, has an ID of 26 mm and a length of 4 m. A silicone oil (5cSt) and a water/glycerol mixture are used as test fluids. This set of liquids is chosen to match the refractive indices of the phases and enable laser based flow pattern identification. A double pulsed Nd:Yag laser was employed (532nm) with the appropriate optics to generate a laser sheet at the middle of the pipe. The aqueous phase was dyed with Rhodamine 6G, to distinguish between the two phases. Experiments were carried out for mixture velocities ranging from 0.15 to 2 m/s. Different inlet designs were used to actuate flow patterns in a controlled way and observe their development downstream the test section. A static mixer produced dispersed flow at the inlet which separated downstream due to enhanced coalescence. On the other hand, the use of a cylindrical bluff body at the inlet created non-linear interfacial waves in initially stratified flows from which drops detached leading to the transition to dispersed patterns. From the detailed images important flow parameters were measured such as wave characteristics and drop size.

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