Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Flow separation characteristics of unstable dispersions[1] VICTOR VOULGAROPOULOS, Department of Chemical Engineering, University College London, Torrington Place, London WC1E 7JE, UK, LUSHENG ZHAI, School of Electrical Engineering and Automation, Tianjin University, Tianjin 300072, Peoples Republic of China, PANAGIOTA ANGELI, Department of Chemical Engineering, University College London, Torrington Place, London WC1E 7JE, UK — Drops of a low viscosity oil are introduced through a multi-capillary inlet during the flow of water in a horizontal pipe. The flow rates of the continuous water phase are kept in the turbulent region while the droplets are injected at similar flow rates (with oil fractions ranging from 0.15 to 0.60). The acrylic pipe (ID of 37mm) is approximately 7m long. Measurements are conducted at three different axial locations to illustrate how the flow structures are formed and develop along the pipe. Initial observations are made on the flow patterns through high-speed imaging. Stratification is observed for the flow rates studied, indicating that the turbulent dispersive forces are lower than the gravity ones. These results are complemented with a tomography system acquiring measurements at the same locations and giving the cross-sectional hold-up. The coalescence dynamics are strong in the dense-packed drop layer and thus measurements with a dual-conductance probe are conducted to capture any drop size changes. It is found that the drop size variations depend on the spatial configuration of the drops, the initial drop size along with the continuous and dispersed phase velocities.

[1]Project funded under Chevron Energy Technology

Victor Voulgaropoulos
University College London

Date submitted: 01 Aug 2016 Electronic form version 1.4