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Mixing of two miscible fluids at high Schmidt number[1] MARK SIMMONS, FEDERICO ALBERINI, University of Birmingham, CHRISTOPHER PAIN, OMAR MATAR, Imperial College London — The blending of two miscible liquids at high Schmidt number is an increasingly common industrial problem: as processes push towards shorter timescales yet the rheology of the fluids becomes increasingly complex. This leads to phenomena which resemble a quasi two-phase system with zero interfacial tension. In this study, we compare experimental results with computational fluid dynamics simulations using unstructured-mesh adaptivity for the flow of two Newtonian, or two power-law fluids through a complex geometry representative of a Kenics type static mixer used in industry. The geometry induces a stretching and folding of the fluid elements which causes exponential growth of the interface length down the geometry. The interfacial topology obtained from the simulations is compared with experiments carried out using Planar Laser Induced Fluorescence (PLIF), which enables the spatial distribution of each phase, and the interfaces between them, to be determined at the outlet of the geometry.

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