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Experimental and computational fluid dynamics studies of mixing of complex oral health products MARTI CORTADA-GARCIA, SIMONA MIGLIOZZI, WEHELIYE HASHI WEHELIYE, University College London, VALENTINA DORE, GlaxoSmithKline Consumer Healthcare, LUCA MAZZEI, PANAGIOTA ANGELI, University College London, THAMES MULTIPHASE TEAM — Highly viscous non-Newtonian fluids are largely used in the manufacturing of specialized oral care products. Mixing often takes place in mechanically stirred vessels where the flow fields and mixing times depend on the geometric configuration and the fluid physical properties. In this research, we study the mixing performance of complex non-Newtonian fluids using Computational Fluid Dynamics models and validate them against experimental laser-based optical techniques. To this aim, we developed a scaled-down version of an industrial mixer. As test fluids, we used mixtures of glycerol and a Carbomer gel. The viscosities of the mixtures against shear rate at different temperatures and phase ratios were measured and found to be well described by the Carreau model. The numerical results were compared against experimental measurements of velocity fields from Particle Image Velocimetry (PIV) and concentration profiles from Planar Laser Induced Fluorescence (PLIF).

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