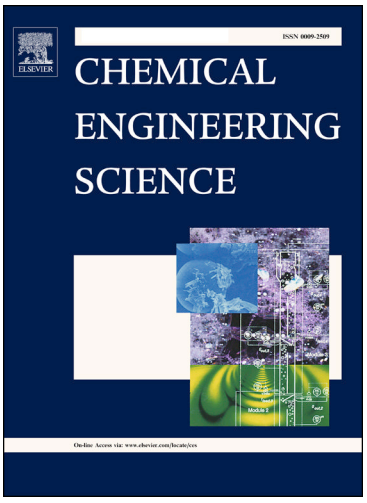

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Micro-PIV measurement and CFD simulation of flow field and swirling strength during droplet formation process in a coaxial microchannel

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Abstract: The liquid-liquid two-phase flow in a coaxial micro-channel was investigated with micro-PIV measurement and computational fluid dynamics (CFD) simulation. The velocity distributions inside and outside of droplet were measured simultaneously. Both experimental and simulated results showed that a pair of symmetrical vortices existed during droplet formation process. In addition, a parameter, swirling strength, was employed to characterize the developing vortices throughout the droplet formation process. The effects of physical properties, such as interfacial tension and viscosity, on fluid flow were also discussed. The results showed that the absolute valued swirling strength increased with the decrease of interfacial tension, while decreased with the increase of continuous phase viscosity. The agreement between the experimental and simulation results in various conditions

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