

Abstract Submitted
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Front tracking for characterizing and quantifying reactive mixing
DOUGLAS KELLEY, THOMAS NEVINS, University of Rochester — Mixing in industrial chemical reactors involves complicated interactions between advection, reaction, and diffusion that are difficult to simulate or measure in detail. However, in large-Damköhler-number systems which show sharp fronts between reacted and unreacted regions, reactor dynamics might be more simply and usefully characterized in terms of the reaction fronts themselves. In fact, prior work has already shown that the reaction rate and material diffusivity can be calculated directly if front speed and front thickness are known. We have developed methods to optically track reaction fronts, measuring their speed and thickness throughout space and time. We will present such measurements in both simulation and experiment, consider their statistics, and discuss future efforts to characterize and quantify mixing in chemical reactors.

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