Abstract Submitted
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High speed velocimetry and concentration measurements in a microfluidic mixer using fluorescence confocal microscopy[1] VENKATESH INGUVA, BLAIR PEROT, University of Massachusetts Amherst, SAGAR KATHURIA, University of Massachusetts Medical School, JONATHAN ROTHSTEIN, University of Massachusetts Amherst, OSMAN BILSEL, University of Massachusetts Medical School — This work experimentally examines the performance of a quasi-turbulent micro-mixer that was designed to produce rapid mixing for protein-folding experiments. The original design of the mixer was performed using Direct Numerical Simulation (DNS) of the flow field and LES of the high Sc number scalar field representing the protein. The experimental work is designed to validate the DNS results. Both the velocity field and the protein concentration require validation. Different experiments were carried out to measure these two quantities. Concentration measurements are performed using a 488nm continuous wave laser coupled with a confocal microscope to measure fluorescence intensity during mixing. This is calibrated using the case where no mixing occurs. The velocity measurements use a novel high speed velocimetry technique capable of measuring speeds on the order of 10 m/s in a micro channel. The technique involves creating a pulsed confocal volume from a Ti-Sapphire laser with a pulse width of 260ns and observing the decay of fluorescence due to the fluid motion. Results from both experiments will be presented along with a comparison to the DNS results.

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