

Abstract Submitted  
for the DFD15 Meeting of  
The American Physical Society

**Design of a rapid magnetic microfluidic mixer** MATTHEW BALLARD, DREW OWEN, ZACHARY GRANT MILLS, SRINIVAS HANASOGE, PETER HESKETH, ALEXANDER ALEXEEV, Georgia Institute of Technology — Using three-dimensional simulations and experiments, we demonstrate rapid mixing of fluid streams in a microchannel using orbiting magnetic microbeads. We use a lattice Boltzmann model coupled to a Brownian dynamics model to perform numerical simulations that study in depth the effect of system parameters such as channel configuration and fluid and bead velocities. We use our findings to aid the design of an experimental micromixer. Using this experimental device, we demonstrate rapid microfluidic mixing over a compact channel length, and validate our numerical simulation results. Finally, we use numerical simulations to study the physical mechanisms leading to microfluidic mixing in our system. Our findings demonstrate a promising method of rapid microfluidic mixing over a short distance, with applications in lab-on-a-chip sample testing.

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Date submitted: 31 Jul 2015

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