

Abstract Submitted
for the DFD16 Meeting of
The American Physical Society

Stokes-flow simulations of a rising particle suspension in a horizontal rotating cylinder SUDARSHAN KONIDENA, ANKIREDDY KATHA, ANUGRAH SINGH, Indian Inst of Tech-Guwahati — Experiments performed by Makrand et al. [1] with a suspension of rising particles in a horizontal rotating cylinder exhibit a wide spectrum of non-equilibrium patterns. The axial banding patterns also show a tendency to travel along the rotational axis. We performed Stokes-flow simulations to investigate the aforementioned axial banding along with providing a mechanism for the traveling bands. An order parameter is established basing on either the centrifugal velocity or rising velocity of an isolated particle and the average angular velocity of all the particles. Basing on the rotational frequency, the low and high frequency bands could be characterized into either gravitationally dominant or centrifugally dominant phases with respect to the order parameter. This analysis could aid in providing with a unifying mechanism for axial banding in horizontal rotating cylinders.

Sudarshan Konidena
Indian Inst of Tech-Guwahati

Date submitted: 02 Aug 2016

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