

Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Transitions between multiple attractors in a granular mixing experiment RALF STANNARIUS, FRANK RIETZ, University of Magdeburg — We report on a granular experiment that produces multiple quasi-periodic patterns in a rotating flat container filled with a bidisperse mixture (0.3 mm and 0.9 mm diameter) of spherical grains. The cell depth is fixed to 0.5 cm (of the order of 10 bead layers), the height is 8 cm. Cell widths are either 17 cm or 50 cm. After an initial transient period, the system develops a lateral band texture of size-segregated grains. These bands show a pronounced spatio-temporally periodic drift in axial direction, sometimes with reflection at the cell ends. In the course of long durations of the experiment, the system switches between different states that appear to be marginally stable oscillatory solutions over many periods. Ageing of the particles as well as external influences on the experiment can be excluded as explanations. In the long term limit, the system does not tend towards a stationary state, neither to a complete segregation, nor to stable bands or uniformly mixed states. The results complement and extend previous observations in cylindrical geometries, and represent a challenge for modeling and theoretical description.

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Date submitted: 22 Dec 2011

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