The Linked Twist Map Approach to Granular Tumbler Mixers[1]
ROB STURMAN, University of Leeds, STEVEN MEIER, Northwestern University, STEPHEN WIGGINS, University of Bristol, JULIO OTTINO, Northwestern University — The simplest type of time-periodic granular tumbler mixer can be cast in the form of a linked twist map (LTM). These are examples of dynamical systems for which, under the correct conditions, the strongest mixing properties can be rigorously proved. Despite the fact that tumblers do not satisfy these conditions, the LTM approach allows the prediction of the location and size of prominent islands in a two-dimensional tumbler, and in three dimensions a similar approach reveals interesting dynamical structures which in turn yield information about islands. The dynamics of a hitherto abstract dynamical system - a piecewise isometry - further suggests that complicated dynamics are not solely the result of dynamics in the flowing layer.

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