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Dimensional crossover in Richtmyer-Meshkov flows\textsuperscript{1} KATSUNOBU
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ABARZHI, Carnegie Mellon University — We analyze nonlinear dynamics of large
scale coherent structures in Richtmyer-Meshkov flows. Group theory based analysis
is applied with a detailed consideration of RM dynamics invariant with respect to
p2mm (3D rectangular), p4mm (3D square) and pn1 (2D) groups. Symmetry dic-
tates that asymptotic solutions form a 2 parameter family for rectangular flows and
a 1 parameter family for 3D square and 2D flows. For 3D square and 2D symmetry,
asymptotic solutions are obtained for the 1st and 2nd order of approximation and
the fastest growth rate occurs at zero bubble curvatures. Fourier amplitudes expo-
nentially decay with increase in order showing that solutions are convergent. Both
2D and 3D square solutions are stable with respect to symmetry conserving pertur-
bations. Isotropic 3D square solutions are universally stable, while 2D solutions are
unstable to anisotropic perturbations. Furthermore, the 3D and 2D solutions cannot
be continuously transformed from one to another, and the dimensional crossover is
discontinuous.

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