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Evolution of inviscid Kelvin-Helmholtz instability from a piecewise linear shear layer ANIRBAN GUHA, MONA RAHMANI, GREGORY LAWRENCE, University of British Columbia — Here we study the evolution of 2D, inviscid Kelvin-Helmholtz instability (KH) ensuing from a piecewise linear shear layer. Although KH pertaining to smooth shear layers (eg. Hyperbolic tangent profile) has been thorough investigated in the past, very little is known about KH resulting from sharp shear layers. Pozrikidis and Higdon (1985) have shown that piecewise shear layer evolves into elliptical vortex patches. This non-linear state is dramatically different from the well known spiral-billow structure of KH. In fact, there is a little acknowledgement that elliptical vortex patches can represent non-linear KH. In this work, we show how such patches evolve through the interaction of vorticity waves. Our work is based on two types of computational methods (i) Contour Dynamics: a boundary-element method which tracks the evolution of the contour of a vortex patch using Lagrangian marker points, and (ii) Direct Numerical Simulation (DNS): an Eulerian pseudo-spectral method heavily used in studying hydrodynamic instability and turbulence.

Anirban Guha
University of British Columbia

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