Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Examining the evolution towards turbulence through spatio-temporal analysis of multi-dimensional structures formed by instability growth along a shear layer[1] ELIZABETH MERRITT, FORREST DOSS, ERIC LOOMIS, KIRK FLIPPO, BARBARA DEVOLDER, LESLIE WELSER-SHERRILL, JAMES FINCKE, JOHN KLINE, Los Alamos National Laboratory — The counter-propagating shear campaign is examining instability growth and its transition to turbulence relevant to mix in ICF capsules. Experimental platforms on both OMEGA and NIF use anti-symmetric flows about a shear interface to examine isolated Kelvin-Helmholtz instability growth. Measurements of interface (an Al or Ti tracer layer) dynamics are used to benchmark the LANL RAGE hydrocode with BHR turbulence model. The tracer layer does not expand uniformly, but breaks up into multi-dimensional structures that are initially quasi-2D due to the target geometry. We are developing techniques to analyze the multi-D structure growth along the tracer surface with a focus on characterizing the time-dependent structures' spectrum of scales in order to appraise a transition to turbulence in the system and potentially provide tighter constraints on initialization schemes for the BHR model. To this end, we use a wavelet based analysis to diagnose single-time radiographs of the tracer layer surface (w/ low and amplified roughness for random noise seeding) with observed spatially non-repetitive features, in order to identify spatial and temporal trends in radiographs taken at different times across several experimental shots.

[1]This work conducted under the auspices of the U.S. Department of Energy by LANL under contract DE-AC52-06NA25396

Elizabeth Merritt
Los Alamos National Laboratory

Date submitted: 11 Jul 2014 Electronic form version 1.4