Abstract Submitted
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A 3D Bubble Merger Model for RTI Mixing BAOLIAN CHENG, Los Alamos National Laboratory — In this work we present a model for the merger processes of bubbles at the edge of an unstable acceleration driven mixing layer. Steady acceleration defines a self-similar mixing process, with a time-dependent inverse cascade of structures of increasing size. The time evolution is itself a renormalization group evolution. The model predicts the growth rate of a Rayleigh-Taylor chaotic fluid-mixing layer. The 3-D model differs from the 2-D merger model in several important ways [1]. Beyond the extension of the model to three dimensions, the model contains one phenomenological parameter, the variance of the bubble radii at fixed time. The model also predicts several experimental numbers: the bubble mixing rate, the mean bubble radius, and the bubble height separation at the time of merger. From these we also obtain the bubble height to the radius aspect ratio, which is in good agreement with experiments. Applications to recent NIF and Omega experiments will be discussed. This work was performed under the auspices of the U.S. Department of Energy by the Los Alamos National Laboratory under Contract No. W-7405-ENG-36.

[1] B. Cheng, J. Glimm and D. Sharp, Chaos 12, 267 (2002).

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