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The Effects of a Spatially Variant Velocity Field On Stretching: Intuitive Measures JASON NIXON, DAVID BIGIO, None — Laminar mixing theory describes the 'goodness' of mixing as a function of increased surface area shared between two fluid species. Previous work describes mixing from a post processing perspective, as a function of stretching history, while disregarding the underlying flow. In this work, mathematical measures are derived which predict fluid-fluid interface behavior in a flow and explore the underlying flow field. This family of measures creates an intuitive basis for the exploration interfacial growth. One set of measure relates velocity to the principal directions while the second set relates interfacial orientation with the principal directions. To explore the usefulness of these new measures, they are simulated in three flows; shear flow, divergent flow, and the spatially variant lid driven cavity. In these geometries, the new family of measures proves valuable for demonstrating growth regime characteristics, transitions in growth regime, as well as other flow characteristics unique to each field. It has been shown that the changes in mixing consistent with reorientation occur after a rapid change in the relationship of the flow and principle directions. The second set of measures in this family allows for interface growth and modeled to be studied more objectively.

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