

Abstract Submitted
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**Use of Eulerian Indicators to Predict Best Mixing Configurations
for a Blinking 2D Lid-Driven Flow**

K. MCILHANY, U S Naval Academy, D. MOTT, Naval Research Laboratory, S. WIGGINS, University of Bristol, UK, E. ORAN, Naval Research Laboratory — The 2D lid driven model with an alternating flow between two double gyres whose relative size differs is used as the basis of a study to determine the predictive capabilities of two Eulerian Indicators (EI), dubbed the “transversality” and “mobility” with respect to the degree of mixing achieved. The “transversality” EI measures the angular difference between the two alternating velocity vectors at a given position in the flows domain. Experiments have indicated that streamline crossing between two alternating flows is associated with regions of good mixing. The “mobility” EI measures the percentage of the flows domain that contributes the most to particle transport. In the parameter space under study, the product of the two EI’s is shown to correlate well with the variance of concentration for the fluid, calculated as a Lagrangian metric. The computational efficiency gained by calculating Eulerian Indicators compared to Lagrangian metrics allows for a more efficient search through this systems parameter space, suggesting configurations which are better suited to mix well, effectively cutting the design time for optimizing new mixing designs.

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