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Identification of Coherent Structures in Premixed Reacting Flows EILEEN HAFFNER, MELISSA GREEN, Syracuse University, ELAINE ORAN, University of Maryland, SYRACUSE UNIVERSITY TEAM, UNIVERSITY OF MARYLAND TEAM — Many studies have been conducted on the best ways to quantitatively characterize the turbulence-flame interaction in reacting flows. It has been observed that increased turbulence intensity both wrinkles and broadens the flame front throughout the preheat zone and reaction zone. A Lagrangian coherent structures analysis is used to identify the individual coherent turbulent structures as the maximizing ridges of the Finite-Time Lyapunov exponent scalar field (FTLE). This method provides different information than Eulerian criteria which have predominantly been used in previous reacting flow studies. Preliminary results show that LCS ridges exhibit a clear qualitative correlation to the contour of the fuel mass-fraction of the flame. A quantitative characterization of how the LCS results correlate to observed flame geometries will allow for a better understanding of how these structures affect the flame brush, and could lead to improved efficiency in particular engines.

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