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Using LCS to study coherent structures in reacting flows[1]
MELISSA GREEN, PETER HAMLINGTON, ALEXEI POLUDNENKO, ELAINE ORAN, Naval Research Laboratory — Previous research has shown that chemical reactions in a compressible fluid flow interact strongly with the surrounding turbulence both in quantitative measures and qualitative character. In the case of a flame propagating through homogeneous isotropic turbulence, the rapid flow expansion generated in the reaction zone causes a significant attenuation in the vorticity. This suppression of the vorticity magnitude complicates the tracking of individual coherent structures using Eulerian methods, therefore we use Lagrangian coherent structures to study the nature of the vortex dynamics, focusing on structure creation, destruction, and reorientation.

[1]This research was performed while the author held a National Research Council Research Associateship Award at the Naval Research Laboratory

Melissa Green
Naval Research Laboratory

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