

## **Abstract**

Recent developments in numerical methodology for combustion simulations that effectively harness modern high-performance parallel computers are able to simulate reacting flows with high-fidelity models for the underlying complex processes. However, a single run of the simulation will produce multiple terabytes of raw data that is vast in the spatial, temporal, and variable (tens of variables) domains, creating a formidable challenge for subsequent analysis and interpretation. Advanced visualization technologies must also be developed to address this challenge. While the main challenge comes from the sheer size of the data and the complex intermittent phenomena that the combustion scientists are trying to understand, the analysis and validation of the simulation output demand intuitive and convenient ways to make simultaneous visualization of multiple scalars, and extracting and tracking 4D flow features. In this talk, I will introduce the state-of-the-art interactive visualization technology, and also describe our ongoing effort to develop multivariate data visualization methods, intelligent system approach to the feature extraction and tracking problem, and novel visualization interfaces.