Capturing transient phenomena using Large-Eddy Simulation of turbulent flows

ABSTRACT

In recent years, an increase in computational power has allowed for high fidelity Large-Eddy Simulation (LES) of complex industrial applications. Traditionally, statistical quantities are extracted from these simulations and compared to experimental measurements. However, there is also strong interest in simulating transient phenomena such as ignition and extinction in combustion and transition and separation in turbulent flows.

In this presentation, I will give an overview of my recent work developing physics-based numerical models to predict complex transient turbulent phenomena. This includes the development of new metrics that can assess the dynamic content and predictability of LES and the use of data assimilation techniques to improve predictions of transient phenomena.

BIOGRAPHY

Jeffrey Labahn is a Postdoctoral Fellow at the Center for Turbulence Research (CTR) at Stanford University. He received his Ph.D in Mechanical Engineering from the University of Waterloo in 2016, where he developed a multi-stream Conditional Source-term Estimation (CSE) combustion model to investigate a high efficient, low emission combustion process called Moderate and Intense Low Oxygen Dilution (MILD) combustion. He joined CTR in 2016 and has focused on the development and application of numerical models which are able to predict transient phenomena in aerospace applications, such as lean blowout in gas turbines.