Abstract Submitted
for the DFD12 Meeting of
The American Physical Society

The bifurcation of scramjet unstart[1] IK JANG, JOSEPH NICHOLS, PARVIZ MOIN, Stanford University — The bifurcation of scramjet unstart is numerically investigated. Near an unstart event, a small change made to the heat released in the combustor causes catastrophic changes in the system. In this talk, this bifurcation structure is studied not only for simple idealized flows but also for a more realistic multi-dimensional model scramjet. In the hysteresis zone of the bifurcation structure, steady but unstable solutions are calculated by means of pseudo-arclength continuation. Pseudo-arclength continuation is performed using Newton-Raphson iteration based on Jacobians computed using an automatic differentiation technique. In addition, eigendecomposition is performed to extract the least stable eigenfunctions describing the system dynamics. Finally, the unstart mechanism and the margins to unstart are evaluated from the bifurcation structure and the linearized system dynamics.

[1]Supported by the PSAAP program of DOE

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Date submitted: 03 Aug 2012 Electronic form version 1.4