

Abstract Submitted  
for the DFD20 Meeting of  
The American Physical Society

**Reacting Simulations of Multi-mode Combustion in a Rapid Compression Machine under HCCI and SICI Modes** NGUYEN LY, MATTHIAS IHME, Stanford University — Multi-mode combustion is of practical relevance due to the possibility of improving engine efficiency, emissions, and performance over single-mode combustion. In particular, Spark Induced Compression Ignition (SICI) can improve the load range and timing consistency of Homogeneous Charge Combustion Ignition (HCCI) while retaining HCCIs advantage in low NO<sub>x</sub> emission and efficiency. We investigate multi-mode combustion dynamics by performing reacting simulations of HCCI and SICI modes in a Rapid Compression Machine (RCM) configuration of Strozzi et al. (2019). The compression phase is simulated using a dynamic mesh approach to resolve the flow fields heterogeneity at Top-Dead-Center (TDC). The impact of this heterogeneity on combustion dynamics after TDC through hot-spot autoignition is investigated.

Nguyen Ly  
Stanford University

Date submitted: 07 Aug 2020

Electronic form version 1.4