Announcing the Final Examination of Joseph Lopez for the degree of Master of Science

Time & Location: April 7, 2017 at 4:00 PM in Harris Engineering Center (HEC) 113
Title: Spectroscopy of 1,3-Butadiene Combustion behind Reflected Shocks

The chemical kinetics of 1,3-butadiene ($1,3$-$C_4H_6$) are important because it is a major intermediate during the combustion of all real fuels. Combustion chemistry of 1,3-butadiene is important for the design of cleaner and more efficient power generation devices and propulsion engines. However, there is only limited information on the chemical kinetics of 1,3-butadiene combustion in the literature.

In the present work, the ignition delay times of 1,3-butadiene mixtures has been investigated using UCF's shock tube and absorption diagnostics. Oxidation of 1,3-butadiene/oxygen/argon mixtures at equivalence ratios ($\Phi$) of 0.3 behind reflected shock waves has been studied at temperatures ranging from 1100 to 1300K and at pressures ranging from 1 to 2atm. Reaction progress was monitored by recording time-histories of 1,3-butadiene concentration, pressure, and OH* radical at a location 2cm from the endwall of UCF's shock tube with an inner diameter of 14cm. 1,3-$C_4H_6$ concentration time-histories were measured by absorption spectroscopy at 10.5μm from the P14 line of a tunable CO2 gas laser. OH* production was measured by recording emission around 307nm with a preamplified gallium phosphide detector and a bandpass filter. Ignition delay times were also determined from the OH* concentration time-histories. The measured concentration time-histories and ignition delay times were compared with literature data and predictions from literature kinetic models. The measured time-histories and ignition delay times provide targets for the refinement of chemical kinetic models at the studied conditions. In addition, the use of atomic resonance absorption spectroscopy (ARAS) for measuring hydrogen atom time histories in a shock tube to study the reaction rate of $H + 1,3$-$C_4H_6$ was demonstrated. ARAS measurements were performed at pressures around 2atm and temperatures

Major: Aerospace Engineering

Educational Career:
Bachelor's of Aerospace Engineer, BS, 2015, University of Central Florida

Committee in Charge:
Subith Vasu, Chair, Mechanical and Aerospace Engineering
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Alain Kassab, Mechanical and Aerospace Engineering

Approved for distribution by Subith Vasu, Committee Chair, on March 24, 2017.

The public is welcome to attend.