Investigation of Ignition Delay for Low Molecular Hydrocarbon Fuel and Oxygen Mixture behind the Reflected Shock

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Abstract : A systematic study has been made for ignition delay times measurement behind a reflected shock wave for the low molecular weight hydrocarbon fuel in argon simulated gas mixtures. The low molecular hydrocarbon fuel-oxygen was diluted with argon for desired concentration is taken for the study. The suitability of the shock tube for measuring the ignition delay time is demonstrated by measuring the ignition delay for the liquefied petroleum gas for equivalence ratios (ϕ =0.5 & 1) in the temperature range 1150-1650 K. The pressure range was fixed from 5-15 bar. The ignition delay was measured by recording the ignition-induced pressure jump and emission from CH radical simultaneously. From conducting experiments, it was found that the ignition delay time for liquefied petroleum gas reduces with increase in temperature. The shock tube was calibrated for ethane-oxygen gas mixture and the results obtained from this study is compared with the earlier reported values and found to be comparably well suited for the measurement of ignition delay times. The above work was carried out using the shock tube facility at propulsion and high enthalpy laboratory, Karunya University.

Keywords : ignition delay, LPG, reflected shock, shock wave

Conference Title : ICAAAAS 2016 : International Conference on Applied Aerodynamics, Aerostructures and Aircraft Systems **Conference Location :** Amsterdam, Netherlands

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Conference Dates : December 01-02, 2016