



INDIAN INSTITUTE OF TECHNOLOGY GUWAHATI  
SHORT ABSTRACT OF THESIS

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Programme of Study : Ph.D.

Thesis Title: Study of the Laminar Burning Velocities and Instabilities of Premixed Producer Gas-Air/O<sub>2</sub> Mixtures at Elevated Pressures

Name of Thesis Supervisor(s) : **Prof. Senthilmurugan Subbiah & Dr. Prathap Chockalingam**

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This thesis consists of experimental investigations and inferences mainly focused on the effects of Initial pressure and composition variation of producer gas mixtures on combustion characteristics. A detailed literature survey on producer gas composition led to the observation of high variation in the composition. The extent of variation in individual gaseous components was recorded and experiments were designed accordingly. A new test facility which was capable of conducting spherical flame experiments such as Laminar burning velocity study in both constant pressure and volume configurations were constructed. The facility was tested for integrity before commissioning. A detailed post-processing procedure was also developed for processing the recorded data such as image-time and pressure-time data. An image processing algorithm was also developed for extracting flame data from the recorded images using a high-speed shadowgraph technique. Laminar burning velocity, Burned gas Markstein length, Effective Lewis number, Critical Lewis number, thermo-diffusive instability parameters and hydrodynamic instability parameters were calculated. The consolidated results brought insights into the Laminar burning velocity and intrinsic instability characteristics of the producer gas mixtures.