Project proposal template – Faculty studentships Summer 2014

Project title	Development of Growth of Laminar Flame Kernel Affected by Turbulence	*Director of Study*	Siva Muppala
Second Supervisor	Siaka Dembele	*School*	Mechanical and Aut
Other members of supervisory team		*Any requirements from applicant (eg degree in specific subject area)*	Chemical or Mechanical Engineering

Project summary

(max 1,000 characters)

Turbulent premixed combustion phenomenon is a totally unresolved issue, with both fundamental and immediate industrial relevance. The phenomenon remains unclear as how at the inception of flame propagation the mechanism of large eddy motion affects the flame propagation. In this numerical investigation, output parameters will be analysed are the history of pressure development and other combustion characteristics, statistical characteristics of these movements. Another major task will be quantification of these effects, with eventual development of semi-empirical relations for further validation studies and future progress. Importance of ignition source of different sizes, location of source and their effect on turbulent flame speed may explain the importance of fall from the maximum values. We will use the advanced large-eddy simulation turbulence approach to:

- observe how small flame kernels are developed from the physical mechanism of cyclic variability for different flow fields, turbulent intensities, length scales and different spectra
- focus on how combustion heat release eventually affects the random motion of the subsequent turbulence, energy and mixture, as a result of movement of large eddies from the duration of initial phase of the developing flames in terms of pressure.