Date: **November 5th**

Time: **10:30 AM**

Location: **Olin 305**

Speaker: **Prof. Jaal Ghandhi**
University of Wisconsin-Madison

Title: **"Spray Mixing in Internal Combustion Engines"**

Abstract

Direct in-cylinder gasoline injection holds the potential to significantly improve the fuel economy of spark-ignition engines. However, achieving these improvements requires that the fuel charge be stratified in an appropriate manner at the time of combustion. In this talk a set of fundamental experiments will be discussed that seek to ascertain the relative role that the turbulent flowfield and spray momentum play in this dynamic mixing process. Planar laser-induced fluorescence measurements of a dopant added to the fuel were performed in a motored internal combustion engine. The images were of sufficient spatial resolution and signal-to-noise ratio to allow calculation of the two in-plane components of the scalar dissipation rate. The scalar dissipation rate statistics at high levels of stratification were found to agree well with published results in canonical flows. A dual-metric scheme was developed to quantify the state of mixedness of the fuel charge and will be discussed in detail. Using this scheme, the effects of the fuel spray momentum were investigated by varying the type of fuel injector and the effect of the engine flowfield was investigated by performing a set of experiments that employed valve deactivation to allow the gas flowfield to relax prior to fuel injection. The results of these experiments strongly suggest that the engine flowfield plays the dominant role in mixing, and the implications of this result will be discussed.