

AEROSPACE & MECHANICAL ENGINEERING



2011 COLLOQUIUM 2012 SEMINARS ARE OPEN TO THE PUBLIC

INFORMAL COFFEE PERIOD BEFORE THE SEMINAR IN ROOM 365 FITZPATRICK HALL
UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556

SPEAKER: Professor William A. Sirignano
Mechanical and Aerospace Engineering
University of California, Irvine
Irvine, California

TOPIC: TURBINE BURNERS: FLAMEHOLDING IN
ACCELERATING FLOW OVER A CAVITY

DATE: Tuesday, April 17, 2012

TIME: 3:30 p.m.

PLACE: 138 DeBartolo Hall

ABSTRACT

Burning in the turbine of a jet engine offers advantages over afterburners and engines without augmentative combustion. A brief review of the thermal analysis showing the potential for turbine burners will be provided. The lecture will focus on the use of cavities to hold flames and complete combustion in a short residence time. A cavity is an interesting choice for the practical configuration but has significant challenges. Computational research will be emphasized but some experimental research activity will be discussed. Hot vitiated air flows through curving, converging channel past a cavity into which fuel and additional air is injected. Consideration is given to flow Reynolds number, cavity volume and shape, location of cavities on curved walls, and locations of the injectors within the cavity. Impacts on mixing and combustion efficiency will be examined. Two- and three-dimensional unsteady Navier-Stokes solutions and experimental images and temperature measurements for reacting, multicomponent flows over cavities will be presented. Various instability mechanisms and their relations to mixing and burning will be discussed: Kelvin-Helmholtz, Rayleigh-Taylor, centrifugal, and Gortler instabilities can be important.

NOTE: *If you are interested in meeting individually with
Prof. Sirignano, please contact Evelyn at 631-5431*