

AEROSPACE & MECHANICAL ENGINEERING



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

SPEAKER: **Dr. Pablo A. Tarazaga**
Department of Aerospace
University of Bristol
Bristol, United Kingdom

TOPIC: **DYNAMICS AND CONTROL**
OF PRESSURIZED OPTICAL MEMBRANES

DATE: Tuesday, March 8, 2011

TIME: 3:30 p.m.

PLACE: 138 DeBartolo Hall

ABSTRACT

Advancing space technology and exploration at reduced weight and cost has driven the need for ultra-lightweight space structures. Work on these gossamer structures has been ongoing since the 1960's and since then, the technology has produced many viable designs including inflatable struts, toroidal systems, and other self-rigidizing systems. In addition, replacing conventional metal or glass-based optical mirrors with lighter-weight and more-easily packaged options has led to the development of flexible, membrane-based mirrors. Research in this area has demonstrated that the use of optical membrane mirrors provides the necessary optical quality for in-space imaging. However, undesirable vibrations caused by internal and external excitations, thermal gradients, slewing maneuvers, etc., limit the performance of the flexible membrane. The literature suggests several approaches to control these membranes mirrors, among them boundary control, membrane augmentation with smart materials, electrostatic actuation and the use of a coupled pressure chamber. In this work, the latter approach has been taken to minimize vibrations in an optical membrane by augmenting a coupled membrane/cavity system with controlled acoustic actuators. The modeling, using an impedance/mobility-based method, and control of these structurally and acoustically-coupled systems is presented, along with summaries of other work in structural dynamics.

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