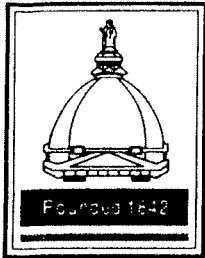


# AEROSPACE & MECHANICAL ENGINEERING



## 2009 COLLOQUIUM 2010 SEMINARS ARE OPEN TO THE PUBLIC

INFORMAL COFFEE PERIOD BEFORE THE SEMINAR IN ROOM 365, ENGR. BLDG.  
UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556

**SPEAKER:** **Juan J. Alonso**  
Department of Aeronautics & Astronautics  
Stanford University  
Stanford, California

**TOPIC:** **THE PROMISES AND REALITIES  
OF MDO (MULTI-DISCIPLINARY OPTIMIZATION)**

**DATE:** Tuesday, March 23, 2010

**TIME:** 3:30 p.m.

**PLACE:** 138 DeBartolo Hall

### ABSTRACT

The field of Multi-Disciplinary Optimization (MDO) has now existed for approximately 30 years and much has been accomplished in that period. But has MDO research truly lived up to the expectations that had been setup for it? One could argue that the idea of automatically designing complex multi-disciplinary systems was intrinsically flawed: a view of MDO as a tool to aid the designer is probably much closer to reality. Regardless, many interesting advances have taken place that have enabled truly revolutionary ideas and designs. This talk highlights three separate MDO-related projects from our recent work that pertain to three separate areas of active research in the MDO field. We begin with the introduction of high-fidelity modeling into the conceptual design of helicopter rotors using reduced-order modeling techniques and time-spectral adjoint methods for unsteady periodic flows. We then investigate the possibility of combining models of varying fidelity into multi-fidelity approximations that are amenable to design optimization of low-boom supersonic business jets. We then discuss the management of uncertainty and the analysis of risk in the operation of hypersonic propulsion systems. We end this talk with some conclusions about the remaining challenges in MDO that must be overcome before these techniques are used pervasively in industrial-level applications.

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