

# AEROSPACE & MECHANICAL ENGINEERING



**2011 COLLOQUIUM 2012  
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**INFORMAL COFFEE PERIOD BEFORE THE SEMINAR IN ROOM 365 FITZPATRICK HALL  
UNIVERSITY OF NOTRE DAME, NOTRE DAME, INDIANA 46556**

**SPEAKER:** **Michael I. Miga, Ph.D.**  
Associate Professor of Biomedical Engineering  
Associate Professor of Radiology & Radiological Sciences  
Associate Professor of Neurosurgery  
Vanderbilt University  
Nashville, Tennessee

**TOPIC:** **SURGERY AND ENGINEERING:  
COMPUTATION ENABLING THEORY**

**DATE:** Tuesday, November 1, 2011

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

**PLACE:** 138 DeBartolo Hall

## **ABSTRACT**

With the continued improvements in high performance CPU/GPU technology, the ability to translate complex analysis using large systems of equations from predictive roles to ones that are more integrated within therapeutic applications is becoming a reality. In this talk, applications in image-guided surgery will be discussed that exploit the use of computationally intense soft-tissue biomechanical models for the enhancement of therapeutic delivery. More specifically, computational models coupled with novel measurement technologies have been integrated with traditional guidance systems such that real-time feedback is provided to adjust the delivery of treatment. Applications towards conventional neurosurgical applications will be discussed as well as more recent developments in intra-abdominal applications for open and minimally invasive liver and kidney surgery. The common thread that ties the work together is that each application involves extrapolating cost-effective relevant information for therapeutic delivery from distinctly finite or sparse data while balancing the competing goals between workflow and engineering design, and between application and accuracy. We call this competing design challenge the 'sparse data extrapolation problem'.

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