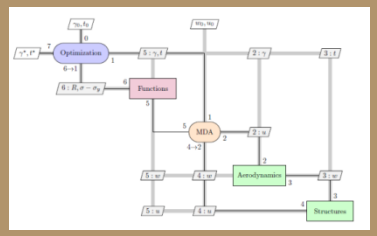
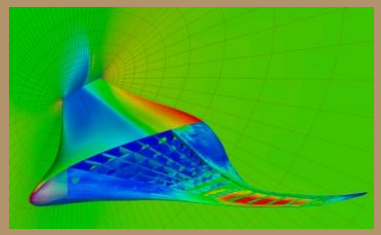
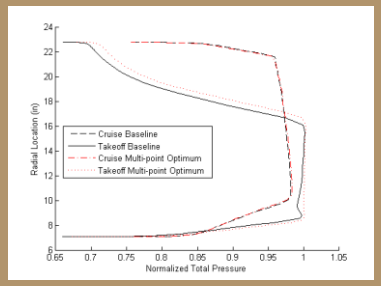
7th Research Consortium for Multidisciplinary System Design Workshop

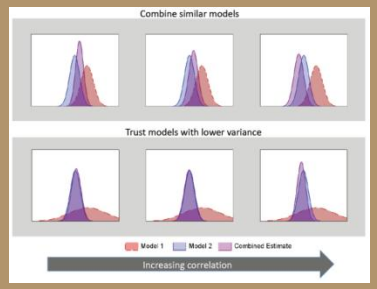
Purdue University, West Lafayette, IN

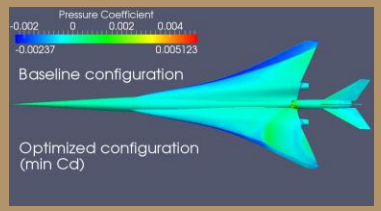
July 19 and 20, 2012

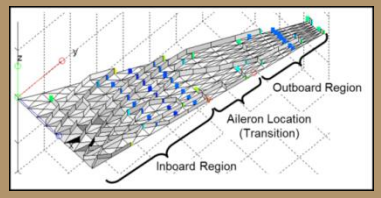












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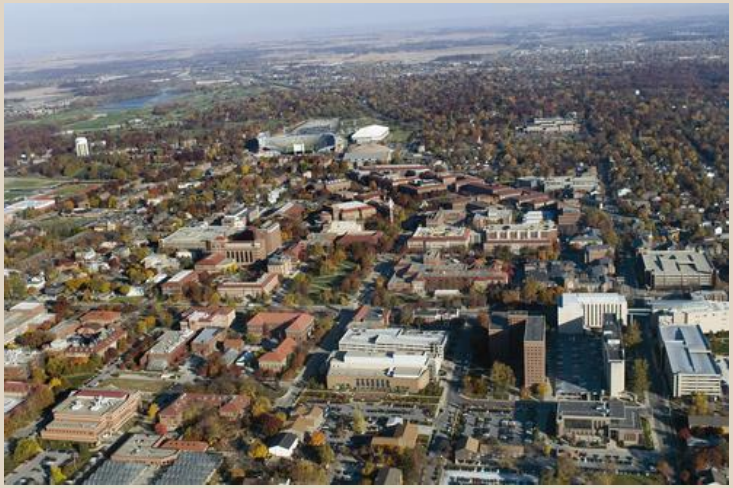
PURDUE UNIVERSITY

Welcome

- Welcome to West Lafayette and Purdue University
- This year marks the 7th annual workshop event
- 1.75 days of presentations and discussions
- Would like to emphasize discussion – make this a workshop to exchange ideas and learn from others

About Purdue University



- **History:** Founded in 1869 as a land-grant university; $150,000 donated by John Purdue, plus 100 acres of land from local residents
- **Facilities:** 165 principal buildings conveniently arranged on 1240 hectares
- **Calendar:** Two semesters, Fall (mid-August through December) and Spring (mid-January through early-May) and a summer session

Purdue University College of Engineering

- First engineering degree granted in 1878
- Living alumni number more than 80,000—including the first and last men on the moon
- $165M in new engineering buildings since 2002
- 362 faculty members
- Fall 2011 enrollment:
  - 7321 undergraduate
  - 2831 graduate

Purdue University School of Aeronautics and Astronautics

- Formally founded in 1945
- Granted more than 7,700 degrees (BS, MS and PhD)
- More than 500 undergraduates (sophomore to senior) and more than 350 graduate students
- Program rankings in *US News & World Report*
  - Undergraduate 4th
  - Graduate 6th
- Engineering ranked in top five of *Aviation Week's* schools for aerospace and defense industry

About the Research Consortium for Multidisciplinary System Design

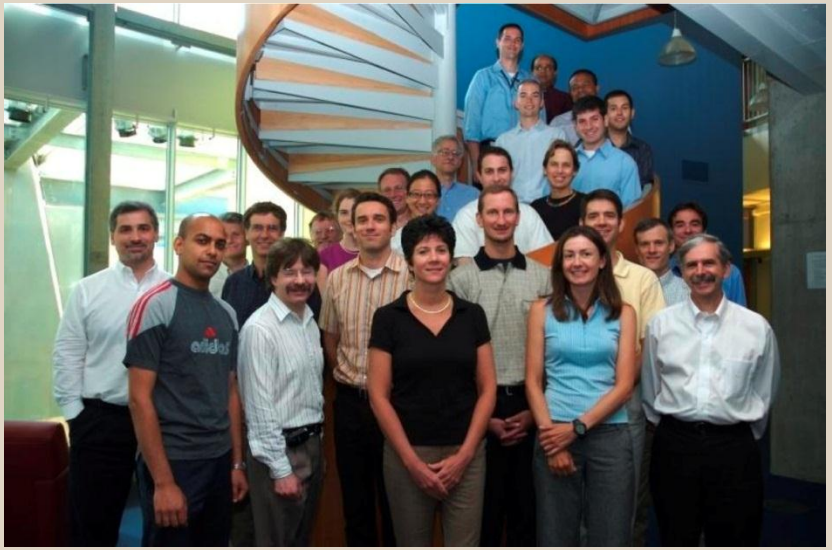
- Initiated in 2006 by faculty members at Stanford and MIT
  - Ilan Kroo and Juan Alonso from Stanford
  - Karen Willcox from MIT
- Initial intents:
  - Foster collaboration and interaction amongst industry, government and academia
  - Combine fundamental research with industrial applications
  - Maintain and improve strong educational components relevant to multidisciplinary system design

About the Research Consortium for Multidisciplinary System Design

- Academic “organizing committee” / “principal investigators” expanded from initial set to include faculty from Purdue and Michigan
  - Juan Alonso, Stanford
  - Bill Crossley, Purdue
  - Ilan Kroo, Stanford
  - Joaquim Martins, Michigan
  - Karen Willcox, MIT
- Consortium has organized a yearly workshop since 2006

Workshop History

- 1st Research Consortium for Multidisciplinary System Design Workshop, Stanford University, June 30, 2006



- 3rd Research Consortium for Multidisciplinary System Design Workshop, MIT , July 17–18, 2009

Workshop History

- 4th Research Consortium for Multidisciplinary System Design Workshop, Stanford, June 11–12, 2009

- 6th Research Consortium for Multidisciplinary System Design Workshop, University of Michigan, July 26-27, 2011

Consortium Discussion (from 2006 workshop introduction)

- Fundamental **research** of practical interest (broadly applicable)
- The **consortium** involves partnerships between the universities, industry, and government labs
- Focus on problems that involve
  - **Multidisciplinary** analyses with complex interactions
  - **System**-level view/focus/approach
  - Uncertainty and need for variable-fidelity representations
- Emphasis on **design**, not just analysis, including:
  - Optimization and computational design
  - Product design, operations, logistics

Consortium Research Elements (from 2006 workshop introduction)

- Novel Optimization / Decomposition Methods
- Multi-fidelity System Modeling for Design
- Design under Uncertainty

Consortium Workshop Objectives for 2012

- Bring together group of researchers and practitioners in a setting that encourages engagement and discussion
- Showcase the research in academia and research labs; discuss future research directions; show success stories and current challenges
- Identify opportunities for future collaborations

2012 Workshop Themes

- Issues, Challenges, Current Efforts
  - Presentations from NASA OpenMDAO, AFRL and collaborators
  - Opportunity for industry and government participants to share
- Multi-fidelity and high-fidelity in MDO
  - Presentations from Michigan, MIT and Stanford
- Novel Approaches
  - Presentations from Purdue and UC Berkeley

2012 Workshop Themes

- Complex Engineered Systems
  - Presentation from MIT
  - A “new” topic for workshop; want to discuss what this means for consortium and workshop participants
- No explicit “uncertainty” topic this year, but it will appear in some talks and is still a focal topic for consortium

2012 Workshop Agenda

- Available on-line at https://engineering.purdue.edu/~crossley/7th_MDO_Workshop
- Organized around themes
- Several breaks for informal discussion and interaction
- Several scheduled discussion periods
  - Want to encourage all participants to discuss opportunities, ideas, challenges, etc. during workshop
  - Use these as times to better understand issues, identify potential ideas for collaborations, suggest important aspects for continuing effort

Other Information

- Breakfast, lunches and breaks provided by School of Aeronautics and Astronautics
  - These will be available in the Amelia's Café area outside room B071
- Thursday dinner – "dutch treat" buffet at Bruno's Pizza
  - Address: 212 Brown Street West Lafayette, IN 47906
- Purdue Air Link (PAL) is wireless service
  - For those who requested guest accounts, information should be in package available from Vickie

2012 Workshop Attendees

first name	last name	affiliation
Doug	Allaire	MIT
Juan	Alonso	Stanford
Ed	Alyanak	AFRL
David	Clark	Boeing
Bill	Crossley	Purdue
John	Dannenhoffer	Syracuse
John Jian	Dong	Boeing
Frode	Engleson	Boeing
Bob	Haimes	MIT
Chris	Heath	NASA GRC
Woody	Hoburg	UC Berkeley
John	Hwang	Michigan
Takashi	Kanno	Purdue
Alexander	Karl	Rolls-Royce
Cory	Kays	MIT
Ray	Kolonay	AFRL
Joaquim	Martins	Michigan
Girish	Modgil	Rolls-Royce
Ken	Moore	NASA
Pat	Piperni	Bombardier
Joe	Simonis	Boeing
Isaac	Tetzloff	Purdue
Karen	Willcox	MIT

Pending travel delays due to weather

Some attendees plan to arrive later during workshop