

HiLiftPW-1

Introduction & Opening Remarks

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The Boeing Company

1st AIAA CFD High Lift Prediction Workshop
Chicago, Illinois
26-27 June 2010

- Organizing Committee
- Objectives
- Background
- Test Cases
- Agenda
 - Participant Guidelines & Information
- Participant Statistics
- AIAA Special Sessions
- Acknowledgments

Organizing Committee

- **Jeffrey Slotnick and Tony Sclafani**
The Boeing Company
- **Rob Lotz**
CD-adapco
- **Mark Chaffin and David Levy***
Cessna Aircraft Company
- **Ralf Rudnik**
DLR – German Aerospace Center
- **Thomas Wayman**
Gulfstream Aerospace Corporation
- **Bob Stuever and Chittur “Venkat” Venkatasubban**
Hawker Beechcraft Corporation
- **Judi Hannon and Chris Rumsey**
NASA Langley Research Center
- **Dimitri Mavriplis***
University of Wyoming

* DPW organizing committee member

Objectives

- Assess the numerical prediction capability (meshing, numerics, turbulence modeling, high-performance computing requirements, etc.) of current-generation CFD technology/codes for **swept, medium/high-aspect ratio wings in landing/take-off (high-lift) configurations**
- Develop practical **modeling guidelines** for CFD prediction of high-lift flowfields
- Advance the understanding of **high-lift flow physics** to enable development of more accurate prediction methods and tools
- Enhance CFD prediction capability to enable practical **high-lift aerodynamic design and optimization**

- **1998-1999** – First series of Trap Wing experiments in NASA LaRC 14x22 WT and NASA ARC 12 Foot PWT
- **2002-2003** – Additional Trap Wing data collected in 14x22 WT
- **2004-2006** – Preliminary discussion of a CFD High-Lift prediction workshop based on Trap Wing datasets
 - External support (e.g. Boeing, etc.) grows during this timeframe
 - Initial thought is to have workshop organized and administered by NASA
- **2006-2007** – Idea of having the workshop organized through AIAA (specifically APA) gains traction, and high-level discussions are held within the APA Vehicle Aerodynamics technical subcommittee
- **Late 2008** – Support for workshop through AIAA is obtained from NASA and key external organizations
- **Orlando 2009** – Official kick-off of workshop and formation of organizing committee
- **Chicago 2010** – HiLiftPW-1

- **Test Case 1 – Grid Convergence Study**
 - Trap Wing “Config 1” (Slat 30, Flap 25)
 - Mach = 0.2, $\alpha = 13^\circ, 28^\circ$
 - Re = 4.3M (based on MAC)
 - Tinf = 520°R
 - Coarse, Medium, Fine, **Extra-Fine** grids
- **Test Case 2 – Alpha Sweep, Flap Increments**
 - Trap Wing “Config 1” (Slat 30, Flap 25)
 - Trap Wing “Config 8” (Slat 30, Flap 20)
 - Mach = 0.2, $\alpha = 6^\circ, 13^\circ, 21^\circ, 28^\circ, 32^\circ, 34^\circ, 37^\circ$
 - Medium Grid
- **Test Case 3 – Slat/Flap Support Effects**
 - Trap Wing “Config 1” (Slat 30, Flap 25)
 - Mach = 0.2, $\alpha = 13^\circ, 28^\circ$
 - Medium Grid

OPTIONAL

Agenda (Day 1)

DAY 1 — Saturday, June 26, 2010

120	7:00	9:00	Registration (Coffee/Pasteries Provided)	
Session 1: Introduction				Slotnick
15	9:00 AM	9:15 AM	Wecome/Introduction	Slotnick
45	9:15 AM	10:00 AM	Geometry/Experimental Data Summary	Hannon
30	10:00 AM	10:30 AM	Grid System Overview	Chaffin
30	10:30 AM	11:00 AM	BREAK	
Session 2: Participant Presentations				Levy
20	11:00 AM	11:20 AM	NASA LaRC CFL3D and FUN3D Contributions to HiLiftPW-1	Lee-Rausch
20	11:20 AM	11:40 AM	ONERA Contribution to HiLiftPW-1	Wiar
20	11:40 AM	12:00 PM	JAXA Contribution to HiLiftPW-1	Murayama
90	12:00 PM	1:30 PM	LUNCH (Not Provided)	
Session 3: Participant Presentations				Venkatasubban
20	1:30 PM	1:50 PM	CFS Engineering and RUAG Aviation Contribution to the Hift-Lift Prediction Workshop	Vos
20	1:50 PM	2:10 PM	ANSYS, Inc. Contribution to HiLiftPW-1	Steed
20	2:10 PM	2:30 PM	OVERFLOW Analysis of the NASA Trap Wing Model Performed at Boeing, Huntington Beach, CA	Sclafani
20	2:30 PM	2:50 PM	NASA Ames Contribution to HiLiftPW-1	Pulliam
40	2:50 PM	3:30 PM	BREAK (Refreshments Provided)	
Session 4: Participant Presentations				Mavriplis
20	3:30 PM	3:50 PM	Metacomp Technologies and CRL Contribution to HiLiftPW-1	Goldberg
20	3:50 PM	4:10 PM	SWIFT and BETA CAE Systems Contribution to HiLiftPW-1	Peddiraju/Luo
20	4:10 PM	4:30 PM	DLR Contribution to the first High Lift Workshop	Rudnik
20	4:30 PM	4:50 PM	Numerical Aspects of NASA Trap-Wing Computations using the DLR TAU Code	Crippa
10	4:50 PM	5:00 PM	Wrap-Up: DAY 1	Slotnick
600				

Agenda (Day 2)

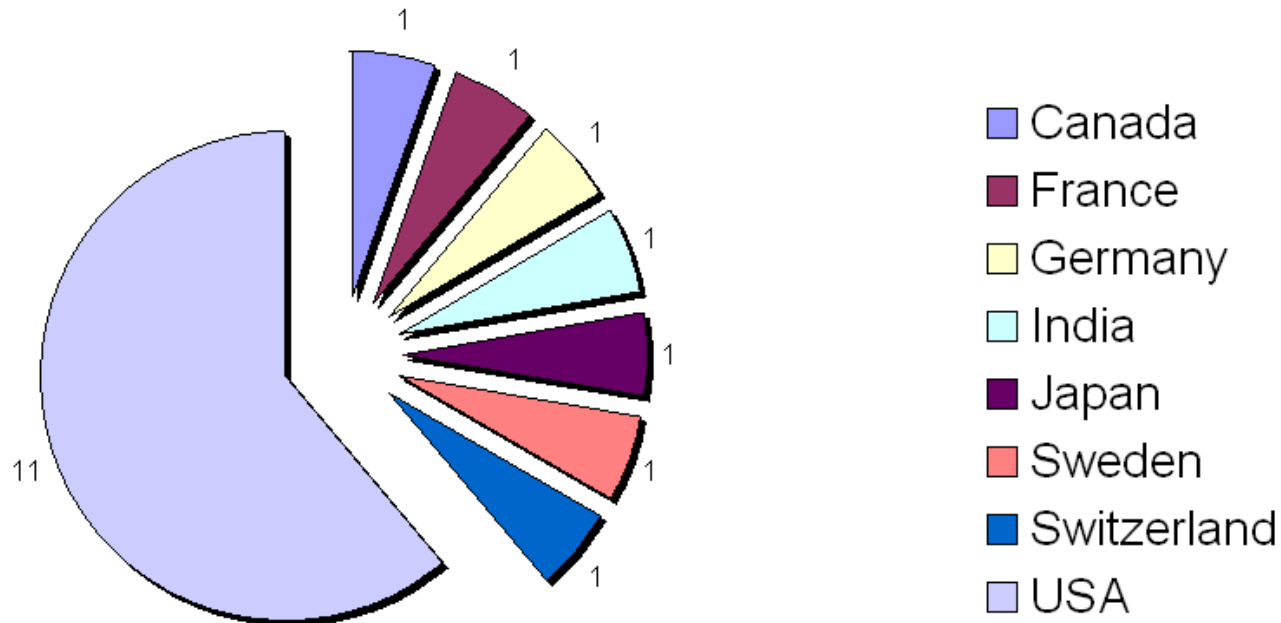
DAY 2 — Sunday, June 27, 2010

60	8:00 AM	9:00 AM	Coffee/Pasteries	
10	9:00 AM	9:10 AM	Day 2 Intro/Announcements	Slotnick
Session 5: Participant Presentations				Rudnik
20	9:10 AM	9:30 AM	University of Wyoming Contribution to HiLiftPW-1	Long
20	9:30 AM	9:50 AM	Unstructured Grid High Lift Aerodynamic Prediction	Venkatasubban
20	9:50 AM	10:10 AM	FUN3D and NSU3D Comparisons for the HiLiftPW-1	Chaffin
20	10:10 AM	10:30 AM	Output-Based Grid Adaptation Applied to the HiLiftPW-1	Park
30	10:30 AM	11:00 AM	BREAK	
Session 6: Participant Presentations				Wayman
20	11:00 AM	11:20 AM	CFD High Lift Calculations using USM3D	Abdol-Hamid
20	11:20 AM	11:40 AM	Participation in the 1st AIAA High Lift Prediction Workshop	Reyes
20	11:40 AM	12:00 PM	FOI Contribution to HiLiftPW-1	Eliasson
80	12:00 PM	1:30 PM	LUNCH (Not Provided)	
Session 7: Participant Presentations				Stuever
20	1:30 PM	1:50 PM	Participation of the Indian Institute of Science in the 1st AIAA CFD High Lift Prediction Workshop	Mani
20	1:50 PM	2:10 PM	Exa Contribution to HiLiftPW-1	Noelting
20	2:10 PM	2:30 PM	Assessment of Grid-Induced Errors in HiLiftPW-1 Predictions Using Error Transport Equations	Cavallo
30	2:30 PM	3:00 PM	BREAK (Refreshments Provided)	
Session 8: Workshop Data Summary & Open Forum				Rumsey
60	3:00 PM	4:00 PM	Workshop Summary	Rumsey
45	4:00 PM	4:45 PM	Panel Session	Rumsey/Slotnick
15	4:45 PM	5:00 PM	Adjourn	Slotnick
530				

- All participant presentations will be 15 minutes with 5 minutes Q/A (please wait until speaker is finished to ask questions)
- Presentations will be uploaded to the HiLiftPW website (<http://hiliftpw.larc.nasa.gov>) after the workshop
- Updates (if desired) to the datasets will be collected after the workshop –
Due date: **September 6th**

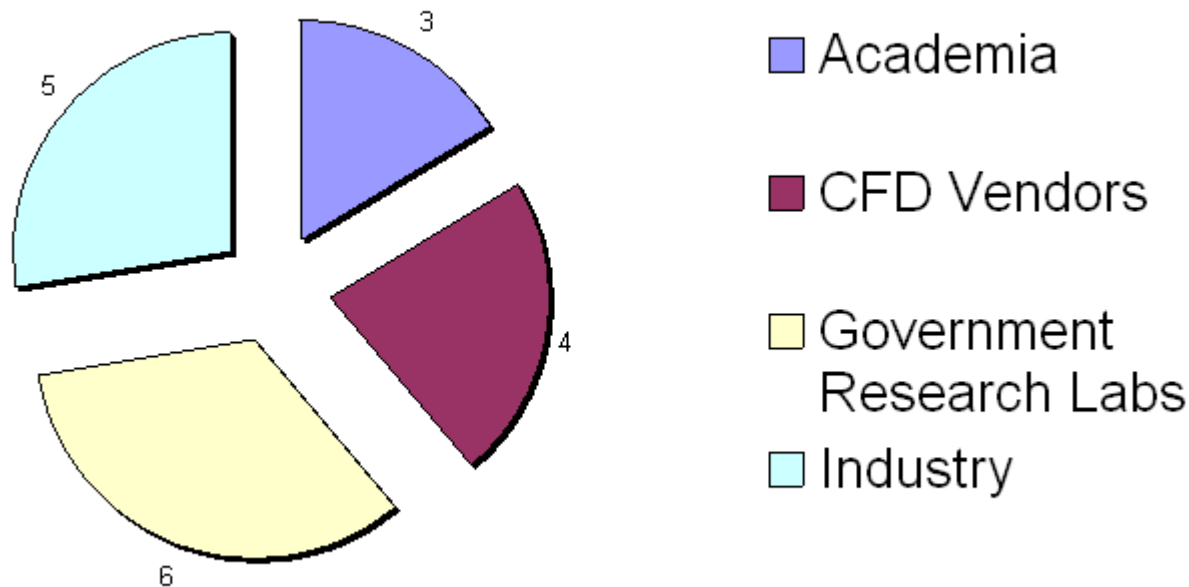
Participant Statistics

- **21** total presentations (32 initially registered on website)
- **18** individual organizations from **8** countries
- **~40%** non-US participation



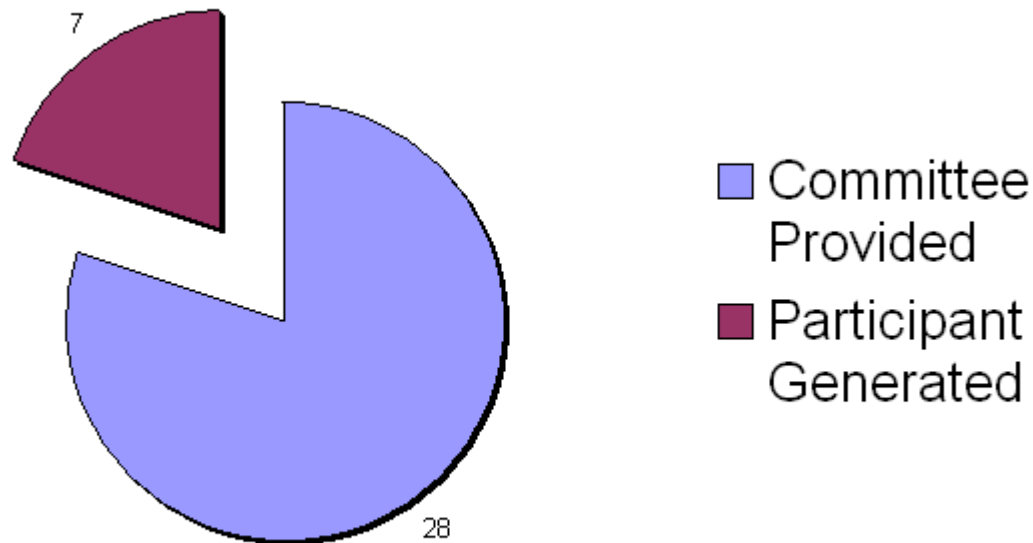
Participant Statistics (2)

- Broad participation from aerospace community



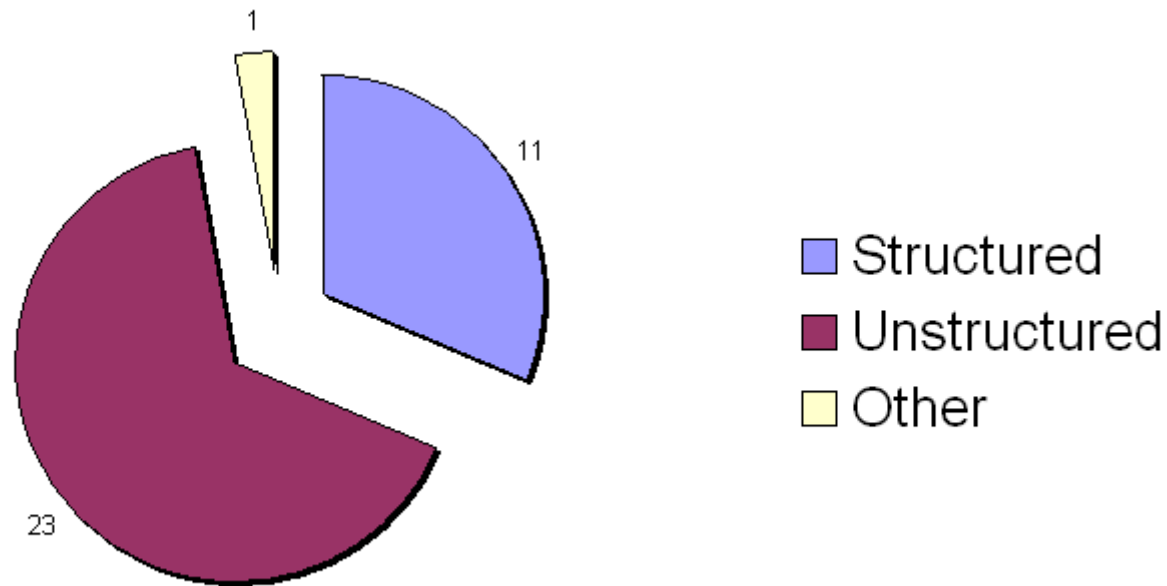
Participant Statistics (3)

- **35** total datasets
- Most participants used committee-generated grid systems



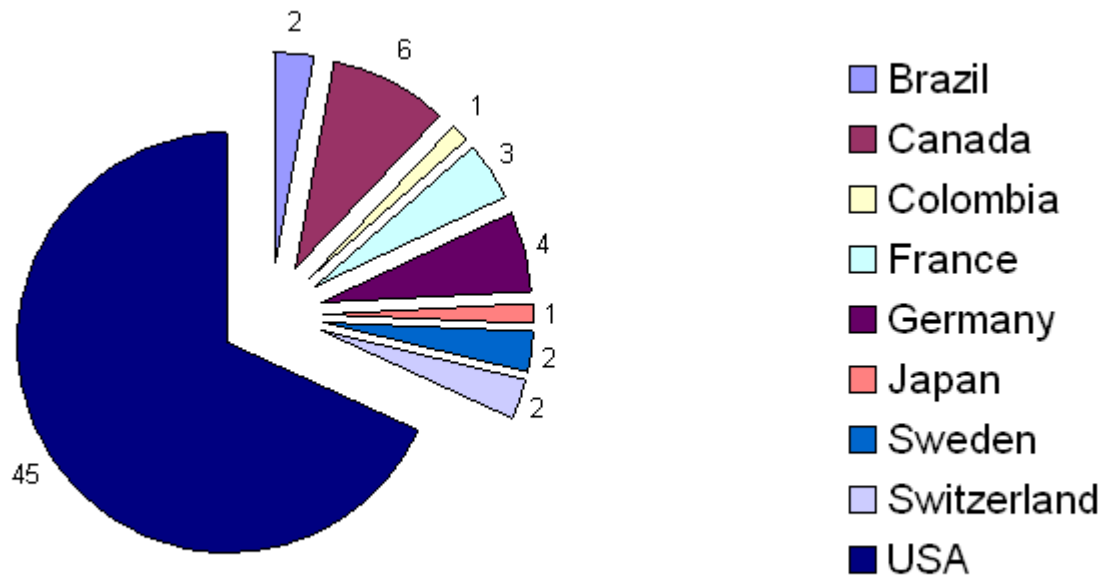
Participant Statistics (4)

- Most participants used unstructured mesh CFD tools and processes



Workshop Registration

- 66 total paid (on-line) registrants from 9 countries



- Two special sessions have been reserved at the Aerospace Sciences Meeting (ASM) in Orlando 2011
 - HiLiftPW-1 overview and summary papers (with one-hour presentations) are planned
 - Nine 30-minute time slots are reserved for participant presentations
 - One 30-minute slot is being reserved for an open forum
- Several additional participants would also like to publish their findings – Possible additional special session planned for the summer meeting in Hawaii 2011 (...Organizing committee to pursue this with APATC)
 - Potentially share more detailed technical analysis of HiLiftPW-1 datasets and results

Acknowledgments

- **Trap Wing Test/CFD Experts**
Paul Johnson, Paul Meredith, Tony Washburn, Meelan Choudhari, Philippe Spalart, Anutosh Moitra
- **Workshop Planning Advisory Board**
John Vassberg, Neil Pfeiffer, Rich Wahls, Deepak Om, Doug Ball
- **NASA Fundamental Aeronautics Subsonic Fixed Wing (SFW) Aerodynamics Technical Working Group (TWG)**
Mike Rogers, Greg Gatlin
- **AIAA Applied Aerodynamics Technical Committee**
Jim Guglielmo, Frank Coton, Rob Vermeland, Jim Despirito
- **AIAA Conference Planning Staff**
Jean Riley, KC Neidermeyr