



CFD AND MDO - STATE OF THE ART AND THE FUTURE

STRATEGY, APPLICATION AND VERIFICATION IN THE USE OF CFD, MDO & FUTURE

LONDON / 16 - 17 OCTOBER 2017

12.30	Registration and Refreshments	
13.00	Welcome and Opening Remarks	Conference Chair: Rodney Irvine MSc BEng FRAeS, Missile Architect, MBDA Systems
13.05	LEAD PAPER - A PARADIGM SHIFT IN THE ROLE OF CFD IN DESIGN, TEST, AND EVALUATION OF AIR VEHICLES	This presentation describes system level analysis capabilities and reduced-order model building from high-resolution simulations that take several days on 104 to 105 cores of a supercomputer to fulfill the needed advancements in air vehicle acquisition. Speaker: Dr Scott Morton, Kestrel Principal Software Developer, University of Dayton Research Institute
14.00	1) AIRBUS CFD	Speaker: Murray Cross, Technology Product Leader - ICSD, Airbus
14.30	2) REACTION ENGINES' USE OF CFD TO ANALYSE SUBSONIC TO HYPERSONIC FLOW REGIEMES	Speaker: Dr Neil Taylor, Reaction Engines
15.00	Networking Refreshment Break	
15.30	3) USE OF CFD AT DSTL	Speaker: Dr Joe Coppin, Senior Scientist, Dstl
16.00	4) SHIP AIRWAKE MODELLING AND VALIDATION FOR FLIGHT SIMULATION	The presentation will focus on the development and validation of a high-fidelity ship airwake model based on CFD data and how this model is being integrated into a piloted flight simulation environment. Speaker: Michael Kelly, Naval Aerodynamics, The University of Liverpool
16.30	5) FUTURE CHALLENGES FOR CFD & MDO: SOME PERSPECTIVES FROM MBDA	Speaker: Dr Nigel Taylor FRAeS, Capability Leader, Aerodynamic Tools & Methods, MBDA
17.00	6) EUROPEAN HR PROGRAMME	Speaker: Prof Arthur Rizzy, KTH Sweden
17.30	Registration and Refreshments	
18.00	RAeS ANNUAL LANCHESTER NAMED LECTURE	

08.30 **Registration and Refreshments**

Welcome and Opening Remarks

Conference Chair:

09.00 **1) VIEW OF CFD METHODS DEVELOPMENT AT UNIVERSITY OF GLASGOW**

This presentation will showcase how the development of fundamental methods of CFD, CSD, CAA, Flight mechanics (FM) can be used to support MDO applications relevant to modern industry problems.

Speaker: Prof George Barakos, Professor, University of Glasgow

10.00 **2) ARA PRESENTATION ON MDO RESEARCH**

Speaker: Dr Andy Peace, Chief Scientist Computational Aerodynamics, Aircraft Research Association Ltd

10.30 **3) LES IN TURBOMACHINERY**

This talk will focus on scale resolving methods primarily with application to turbomachinery and discuss advantages, disadvantages and best practices.

Speaker: Dr Richard Jeffereson-Loveday, Assistant Professor, University of Nottingham

11.00 **Networking Refreshment Break**

11.30 **4) CFD IN 2030'S**

In 2012, NASA challenged a multidisciplinary team from industry and academia to provide a knowledge-based forecast and research strategy for developing a visionary computational fluid dynamics (CFD) capability in the notional year 2030. Findings and recommendation of this study, along with the research efforts underway at NASA toward achieving the 2030 vision for CFD, will be discussed in this presentation

Speaker: Dr Mujeeb Malik, Senior Aerodynamicist, NASA Langley Research Center

12.00 **5) QUANTUM COMPUTING FOR NON LINEAR PARTIAL DIFFERENTIAL EQUATIONS**

Speaker: Dr Michael Lubasch, Postdoctoral Research Assistant, Department of Physics, University of Oxford

12.30 **6) MDO AT EARLY DESIGN STAGE**

Speaker: Prof Marin Guenov FRAeS, Head of Centre for Aeronautics, Cranfield University

13.00 **Networking Lunch**

14.00 **7) AIRFRAME AEROELASTIC ANALYSIS, DESIGN AND DEVELOPMENT USING CFD**

The talk will present an overview of these recent developments and it will also highlight how simplifications of early attempts led to an industrial adoption, and how future challenges might lead back to these beginnings.

Speaker: Dr Sebastian Timme, Lecturer, University of Liverpool

14.30 **8) SIMULTANEOUS AIRCRAFT DESIGN AND AIRLINE ALLOCATION USING A PARALLEL MDO FRAMEWORK**

Recent advances in MDO enable aircraft design optimization with CFD-based simulation of full mission profiles for a large network of routes. Using an MDO framework built on a generalization of the adjoint method, we simultaneously optimize the wing shape, operational profiles, and route allocation to explore the coupling between the aircraft design and its operation from the airline's perspective.

Speaker: Dr John T Hwang, Research Engineer, NASA Glenn Research Center

15.00 **9) HIGH-FIDELITY MULTIDISCIPLINARY DESIGN OPTIMIZATION FOR THE NEXT GENERATION OF AIRCRAFT**

Speaker: Prof Joaquim Martins, Professor of Aerospace Michigan, University of Michigan

15.30 **Networking Refreshment Break**

16.00 **10) DESIGN OF A BOUNDARY LAYER INGESTION PROPULSOR USING AN AERO-PROPULSIVE COUPLED ADJOINT APPROACH, NASA GLENN**

Boundary Layer Ingestion is a coupled propulsion-aerodynamic concept for reducing aircraft fuel burn. It is not a new concept but practical development has always been hindered by the design challenges associated with the tight coupling between the aerodynamics and the propulsion system.

Speaker: Justin Gray, OpenMDAO Team Lead, NASA Glenn Research Center

- 16.30 **11) OPTIMIZING TRIBOLOGICAL FLOW AND INCLUDING FLUID-STRUCTURE INTERACTION LUBRICATION**
is an important topic in all machines with moving parts, and this is an especial concern for the aero-engine, where weight and dimensional constraints present challenges for bearing design. This presentation will focus on the lubrication of rough surfaces.
Speaker: Prof Alison Mcmillan, Professor in Aerospace Technology, Wrexham Glyndwr University
- 17.00 **12) FLAPPING WING PROPULSION AERODYNAMICS**
Speaker: Prof.Dr.Ir Harry Hoeijmakers, Chair Engineering Fluid Dynamics, University of Twente
- 17.30 **PANEL DISCUSSION**
- 18.00 **END OF CONFERENCE DAY 2**