HiFiLeD SYMPOSIUM

2nd High-Fidelity Industrial LES/DNS Symposium

Paving the Way for Future Accurate CFD

TECHNICAL PROGRAM

Day 1: Wednesday, 22nd of September

8h50 Opening HiFiLed Symposium, Charles Hirsch
Opening Session **Chair: Charles Hirsch**
9h00 Keynote: Philippe Spalart, "Turbulence Research in the 21st Century" **10h00 Technical Session I:** ***Chair**: Charles Hirsch* **10h00** C. Caillaud, G. Lehnasch, E. Martini, P. Jordan, E. Goncalves, L. Hallo, T. Bridel Bertomeu, "*High Fidelity Simulation of Hypersonic Streaks instabilities and transition*" **10h30** François Lepage and Catherine Mavriplis, "*Low-Reynolds Number Direct Numerical Simulation of Flow Past Iced NLF-0414 Airfoils*"
11h00 Coffee Break
11h30 A. Ballatore, "*LES pressure-based characterisation of under-expanded cold hydrogen jets for engine applications*" **12h00** Dhruv Apte, Mingming Ge, Olivier Coutier-Delgosha, "*Simulation of cloud cavitation in a venturi using RANS, DES and LES*" **12h30** C. Mockett, M. Fuchs, H. Hetmann, T. Knacke, F. Kramer, N. Schönwald, "*Evaluation of DES with enhanced shielding for complex automotive aerodynamics*"
13h00 Lunch Break

Session on High-Order Methods and applications
Chair: Vincent Couaillier

14h00 Keynote:

Peter Vincent, Imperial College London, "Application of high-order methods to the simulation of turbulent flows"

15h00 Technical Session II:

Chair: *Vincent Couaillier*

15h00 Sylvain Laizet, "High-Fidelity LES/DNS of turbulent flows using high-order finite-difference schemes on a Cartesian mesh"
15h30 Nima Fard Afshar, "*High-Order Implicit Large Eddy Simulation of Flow over a Low-Reynolds Turbine Cascade*"
16h00 Andrea Crivellini, Alessandra Nigro, Alessandro Colombo, Antonio Ghidoni, Gianmaria Noventa, "*Efficient scale-resolving simulations of transitional incompressible flows with the discontinuous Galerkin method*"
16h30 Antonella Abba, Luca Bonaventura, "*LDG method with p-adaptivity applied to LES of time dependent flows*"

17h00 Coffee Break

17h20 Mini-Symposium "Advances in efficient High-Order methods and curved grid generation for high-fidelity simulation of turbulent flows"

Organizers*: A. Chemin, JF Remacle, A. Colombo, F.C. Massa , K.Hillewaert, M. Rasquin, T. Toulorge*
Chair: *Michel Rasquin*

17h20 Andrea Beck, Jonas Zeifang, Marius Kurz, Pascal Mossier, Anna Schwarz, Patrick Kopper, "*Advances in Shock Capturing for High Order DG Schemes*"
17h40 Krzysztof Fidkowski, "*Scale-resolving turbulence simulations through adaptive high-order discretizations and data-enabled model refinements*"
18h00 Gregor Gassner, "*TBC*"
18h20 Adrien Loseille, "*TBC*"
18h40 Jean-Francois Remacle, "*Generation of High-Order Coarse Quad Meshes on CAD Models via Integer Linear Programming*"

Day 2: Thursday, 23rd of September

Session on wall-modeled LES
Chair: MV Salvetti

9h00 Keynote:

Stefan Hickel, TU Delft: "Wall modelling in Large Eddy Simulations"

10h00 Technical Session III:

Chair: *MV Salvetti*

10h00 Kenneth Jansen, "*Scale resolving simulations of strong favorable and adverse pressure gradients*"
10h30 Timofey Mukha, Philipp Schlatter, "*Wall-Modelled LES with Nek5000*"
11h00 P. Balakumar; "*Wall-Modeled LES for Flows over an NACA-0012 Airfoil*"

11h30 Mini-Symposium "Wall modeled LES"

Organizers*: K. Hillewaert, M. Rasquin, M.V. Salvetti, O. Lehmkuhl, S. Hickel*
Chair*: K. Hillewaert*

11h30 Pierre Sagaut, Sylvia Wilhelm, Shanggui Cai, Jérôme Jacob, Johan Degrigny, Jean-François Boussuge, "*Recent advances in wall modelling for turbulent flow simulations based on Cartesian grid approaches*"
11h50 George I. Park, "*Efficient implementation of wall models and their evaluation in nonequlibrium boundary layers*"
12h10 Johan Larsson, Ali Kahraman, Siavash Toosi and Ivan Bermejo-Moreno, "*Adaptivity in wall-modeled large eddy simulation*"
12h30 Xian Yang, "*Towards the Best Practice in Wall-modeled Large-eddy Simulation of Heat Transfer Problems*"
12h50 Jan Nordström, Fredrik Lauréna, "*Energy Stable Wall Modeling for the Navier-Stokes Equations*"
13h10 E. Rondeaux, C. Angelberger, A. Poubeau, M. Munoz-Zuniga, R. Paoli, "*Assessment of Machine Learning for the development of Wall Functions for complex flows*"

13h30 Lunch Break

Session on computational technology and High-Performance Computing
Chair: Peter Vincent

14h30 <u>Keynote</u>:
Mujeeb R. Malik, NASA: “Computational Technology Toward Enabling Certification by Analysis”

15h30 Technical Session IV:
Chair: *Peter Vincent*

15h30 Xavier Alvarez-Farré, Adel Alsalti-Baldellou, Andrey Gorobets, Assensi Oliva, F. Xavier Trias, “*Enabling larger and faster simulations from mesh symmetries*”
16h00 Michael Bergmann, Christian Morsbach, Graham Ashcroft, Edmund Kügeler, “*Statistical error estimation methods for engineering-relevant quantities from scale-resolving simulations*”

16h30 Coffee Break

16h50 <u>Mini-Symposium</u> “HPC and GPU porting”
Organizer/Chair*: Ivan Spisso*

16h50 Matthew Martineau, “*Accelerating CFD applications with GPUs: the OpenFOAM - AmgX case study*”
17h10 *S. Bnà et al., “GPU-accelerated volcanic plume simulations with OpenFOAM in mixed-precision”*
17h30 M. Bernarndini, F. Salvadore, “*STREAmS: a high-fidelity accelerated solver for Direct Numerical Simulation of compressible wall-bounded turbulent flow*”
17h50 G. Oyarzun, R. Borrell, G. Houzeaux, “*Optimizing Alya for LES simulations on GPU-accelerated nodes*”
18h10 Joeffrey Legauax, “*GPU port through OpenACC of AVBP*”
18h30 M. Waldmann, G. Brito-Gadeschi, M. Gondrum, M. Meinke, W. Schröder, “*Implementation of a Lattice Boltzmann method for the analysis of landing-gear noise on GPU based HPC Systems*”

Day 3: Friday, 24th of September

Session on physical and turbulence modelling
Chair: Suad Jakirlić

9h00 <u>Keynote</u>:
Luc Vervisch, CORIA, “Turbulent reactive flow simulation, from physical modelling to machine learning”

10h00 <u>Mini-Symposium</u> “Current trends in modelling and simulation of turbulent flows”
Organizer and chair: *Suad Jakirlić*

10h00 Sébastien Deck and Nicolas Renard, “*Solving the RANS/LES boundary layer shielding issue on any mesh resolution: application to Zonal Detached Eddy Simulation*”
10h20 Andrew Mole, Alex Skillen, Alistair Revell, “*Recent developments and application of embedded turbulence simulation*”
10h40 Rémi Manceau, Puneeth Bikkanahally, “*Hybrid Temporal LES: from theory to applications*”
11h00 Andrea Beck, Marius Kurz, “*Advances in Data-Driven Turbulence Modeling*”
11h20 S. Wegt, R. Maduta, S. Jakirlic, “*An upgrade of a near-wall Reynolds stress model based on elliptic blending*”
11h40 F .Xavier Trias, X. Alvarez-Farré, A. Gorobets, A. Oliva, “*Preserving operator symmetries on unstructured grids: paving the way for DNS and LES simulations on complex geometries*”

12h00 Lunch Break

Technical Session
Chair: Stefan Wallin

13h00 Technical Session V:

Chair: *Stefan Wallin*

13h00 Bhanu Prakash, Danilo Jose Mendes, Sergio Illera, Enric Aramburu, "*Application of physics informed machine learning framework to correct turbulent Reynolds Stresses modelled from Reynolds-Averaged Navier-Stokes equations*"
13h30 Paolo Errante, Alexis Giauque, Aurélien Vadrot, Christophe Corre, "*Large Eddy Simulation of a transonic dense gas flo*w"
14h00 Neil Ashton, Paul Batten, "*Towards best-practices for hybrid RANS-LES simulations of complete high-lift aircraft geometries*"

14h30 Round table discussion
"On current progress on high-fidelity industrial simulation and turbulence modelling"

15h30 Closure of the HiFiLed Symposium, Charles Hirsch