16th Biennial Summer Program
Center for Turbulence Research

PROJECTS AND PARTICIPANTS

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COMBUSTION

Effects of wall heat transfer on flame stabilization and dynamics
Abdulla Ghani, Thierry Poinsot
Fluid Mechanics Institute, Toulouse (CNRS)/CERFACS, France
Host(s): Lucas Esclapez

Indirect Combustion Noise Simulation in a High Pressure Turbine Stage
Friedrich Bake
German Aerospace Center, Berlin
Host(s): Jeff O’Brien, Jeonglae Kim

Including real fuel chemistry in Large Eddy Simulation of turbulent combustion
Bénédicte Cuenot, Anne Felden
CERFACS Toulouse, France
Host(s): Lucas Esclapez, Hai Wang

Inspecting Lagrangian Coherent Structures in turbulent combustion
Vineeth Nair
Indian Institute of Technology, Bombay
Host(s): Matthias Ihme, Luca Magri

Analysis of a Transverse Combustion Instability in a Full Rocket Engine Under Supercritical Conditions
Laurent Selle, Anna federica Urbano
French National Center for Scientific Research
Host(s): Daniel Banuti, Lluis Jofre-Cruanyes, Dokyun Kim

Sub-grid scale modeling of the equation of state for fully compressible large-eddy simulation of oxy-combustion
Pascale Domingo, Guillaume Ribert, Luc Vervisch
INSA de Rouen / CNRS CORIA, France
Host(s): Matthias Ihme

Evaluation of optimal ignition placement using adjoint techniques
Ubaid A. Qadri
Imperial College, London
Host(s): Luca Magri

Evaluation of the Subgrid Turbulence Dispersion Model for Spray under the Influence of Flames
Xinyu Zhao
University of Connecticut
Host(s): Lucas Esclapez, Javier Urzay

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LES AND WALL MODELING

A Comparative Study of Wall Models for LES of a NACA 4412 airfoil at near-stall conditions
Prahladh S. Iyer
National Institute of Aerospace, Virginia
Host(s): Mike Howland, George Park,

Dynamic model for the near-wall region based on reduced representations and system identification
Taraneh Sayadi, Peter J. Schmid
Imperial College, London / University of Illinois, Urbana-Champaign
Host(s): Curtis Hamman, Adrian Lozano-Duran

Exploring nonlinear subgrid-scale models and new characteristic length scales for large-eddy simulation
Maurits Silvis, Roel Verstappen
University of Groningen, The Netherlands
Host(s): Mahdi Abkar, Jane (Hyunji) Bae, Niranjan Ghaisas

Assessment of WMLES in complex geometries
Oriol Lehmkuhl
Technical University of Catalonia
Host(s): George Park

Towards Real-Time High-Fidelity Simulation using Integral Boundary Layer modeling
Alexandre Marques, Qi Qi Wang
Massachusetts Institute of Technology
Host(s): Sanjeeb Bose

Extending the Dynamic Slip Boundary Condition to Variational Multiscale Methods
Corentin Carton de Wiart, Scott Murman
NASA Ames Research Center
Host(s): Sanjeeb Bose

Large-eddy simulation of roughness induced turbulent separation in adverse pressure gradient
Jongwook Joo
United Technologies Research Center (UTRC)
Host(s): Sanjeeb Bose, Jeonglae Kim

Towards low-order models of wall turbulence
Beverly McKeon, Kevin Rosenberg, Theresa Saxton-Fox
California Institute of Technology
Host(s): Adrian Lozano-Duran, Aaron Towne

Statistical Mechanics-based Closures for Large Eddy Simulations
Karthik Duraisamy, Eric Parish
University of Michigan
Host(s): Jane (Hyunji) Bae, Parviz Moin

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AEROACOUSTICS

**Effects of heat transfer on transitional states of supersonic boundary layers**  
Abdellah Hadjadj, Mostafa Safdari Shadloo  
Institut National des Sciences Appliquées de Rouen, France  
Host(s): Sanjiva Lele

**Laminar boundary layer instability noise: aeroacoustic or hydrodynamic feedback?**  
Stephane Moreau, Marlene Sanjose  
Université de Sherbrooke, Canada  
Host(s): Sanjeeb Bose

**Prediction of supersonic heated jet noise using non-parallel flow asymptotics and Large-eddy simulation data within Goldstein’s acoustic analogy**  
Adrian Sescu, Vasileios Sassanis  
Mississippi State University  
Host(s): Guillaume Bres, Sanjiva Lele, Aaron Towne

NUMERICAL METHODS

**DNS of a turbulent buoyant helium plume using unstructured high-order low-Mach discretizations**  
Stefan P. Domino  
Sandia National Laboratory  
Host(s): Javier Urzay

**Numerical modeling of shockwaves in biomedicine**  
Stefan Adami  
Technische Universität, München, Germany  
Host(s): Ivan Bermejo-Moreno

**Development of LES-Subgrid Models for High-Order DG Schemes**  
Andrea Beck  
University of Stuttgart, Germany  
Host(s): Yu Lv

**LES of shock-turbulence interaction using unstructured high-order DG**  
Jean-Sebastien Cagnone, Koen Hillewaert  
Cenaero Headquarters, Belgium  
Host(s): Yu Lv

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INSTABILITY AND TRANSITION

Very-large-scale, physically realistic spatially-developing direct numerical simulation (DNS) on von Karman rotating disk boundary layer
Xiaohua Wu
Royal Military College of Canada
Host(s): Parviz Moin

Instability and Transition of a Mach 5.8 Zero Pressure Gradient Boundary Layer Over a Thermomechanically Compliant Panel
Daniel Bodony
University of Illinois at Urbana-Champaign
Host(s): Daniel Bodony

Evolution of vortex-surface fields in transitional boundary layers
Yue Yang, Yaomin Zhao
Peking University, China
Host(s): Philipp Hack, Jeonglae Kim

Causal structure evolution in turbulence cascade
X. San Liang
Nanjing Institute of Meteorology, China
Host(s): Adrian Lozano-Duran

Turbulence modulation by variable density and viscosity
Bendiks Jan Boersma, Ashish Patel, Rene Pecnik, Jurriaan W. R. Peeters
Delft University of Technology
Host(s): Mahdi Esmaily-Moghadam

Separation control in a hypersonic compression ramp interaction
Anne-Marie Schreyer
Technische Universität Braunschweig, Germany
Host(s): Ivan Bermejo-Moreno, Jeonglae Kim, Javier Urzay

Symmetry breaking in 3D wakes
Georgios Rigas
California Institute of Technology
Host(s): Gianluca Iaccarino

UNCERTAINTY QUANTIFICATION

Model-Form Uncertainty in RANS Simulations: An Approach to Fully Explore Uncertainty Space
Jianxun Wang, Heng Xiao
Virginia Tech
Host(s): Wouter Edeling
Uncertain Flow Solutions due to Stochastically Varying Geometries
Jan Nordström, Markus Wahlsten
Linköping University, Sweden
Host(s): Gianluca Geraci, Gianluca Iaccarino

Adjoint-based sensitivity analysis of a reactive jet in cross flow
Palash Sashittal, Taraneh Sayadi
University of Illinois at Urbana-Champaign
Host(s): Ik Jang, Luca Magri

Richard Ahlfeld
Imperial College, London
Host(s): Gianluca Geraci, Gianluca Iaccarino, Aashwin Mishra

Towards a Chaotic Adjoint for LES
Patrick J. Blonigan, Pablo Fernandez del Campo
Massachusetts Institute of Technology
Host(s): Karthik Duraisamy, Ik Jang

Uncertainty Quantification of RANS modeling: Perturbation of the eigenvectors of the deviatoric part of the Reynolds Stress tensor
Roney Thompson
Universidade Federal Fluminense, Brazil
Host(s): Aashwin Mishra

Second-order statistics of transitional and turbulent spatially evolving flows
Armin Zare, Mihailo Jovanovic
University of Minnesota
Host(s): Aaron Towne, Adrian Lozano-Duran, Philipp Hack

MULTI-PHASE FLOWS

Modeling Primary Atomization
Marcus Herrmann
Arizona State University
Host(s): Ronald Chan, Lluis Jofre-Cruanies

Multiscale Geometrical Lagrangian statistics: Extensions and applications to particle-laden turbulent flows
Marie Farge Coulombier, Kai Schneider
Aix-Marseille Université, France
Host(s): Maxime Bassenne, Mahdi Esamily-Moghadam, Jeremy Horowitz

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Why are Sandstorms so Shocking?
Mustafa Rahman, Cheng Wan
King Abdullah University of Science and Technology, Saudi Arabia
Host(s): Javier Urzay

Turbulence in Living Fluids
Amin Doostmohammadi
University of Oxford
Host(s): Javier Urzay

Simulation of a reactive fluidized bed reactor using coupled CFD DEM
Yann Dufresne, Vincent Moureau
French National Centre for Scientific Research
Host(s): Matthias Ihme

Turbulence and Inertial Effects in Flow Through a Porous Bed: DNS and Analysis
Sourabh V. Apte, Xiaoliang He, Pedram Pakseresht
Oregon State University
Host(s): Ali Mani

Real-gas effects in transcritical multi-phase injection and mixing at high pressure
Stefan Hickel, Jan Matheis
Technische Universiteit, Delft
Host(s): Daniel Banuti, Lluis Jofre-Cruayes
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