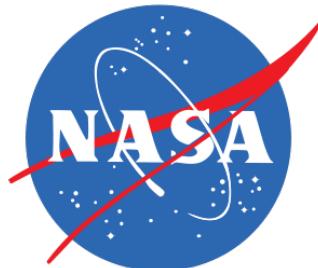# PROGRAM

# PRESENTATION OF RESEARCH PLANS

*17th Biennial Summer Program*
*Center for Turbulence Research*

Monday, June 25, 2018
10:00 AM – 4:30 PM
Bishop Auditorium

**10:00 AM**      **Introduction: Parviz Moin**

**10:20AM**       **ANALYSIS AND MODELING OF WALL TURBULENCE**
**Overview**      **Adrian Lozano-Duran**

*A multifractal model for the current density through an ion-selective membrane in the overlimiting regime*
Xiang Yang and Haosen Xu
Pennsylvania State University, United States
Host(s): Karen Wang and Ali Mani

*The origin of wall turbulence over complex surfaces*
Akshath Sharma, Garazi Gomez de Segura, and Ricardo Garcia-Mayoral
University of Cambridge, United Kingdom
Host(s): Danah Park and Ali Mani

*Three-dimensional transient channel flow due to a transverse pressure gradient*
Shuisheng He and Jundi He
The University of Sheffield, United Kingdom
Host(s): Adrian Lozano-Duran and Minjeong Cho

*Estimating logarithmic-layer turbulence from observations of the wall pressure*
Javier Jimenez and Miguel Perez Encinar
Universidad Politecnica de Madrid, Spain
Host(s): Adrian Lozano-Duran

*Exploiting the restricted nonlinear model to understand the laminarization mechanism and optimize control of turbulence*
Brian Farrell, Petros Ioannou, and Marios-Andreas Nikolaidis
Harvard University, United States
National and Kapodistrian University of Athens, Greece
Host(s): Michael Karp, Javier Jimenez, and Adrian Lozano-Duran

*Physics-based near-wall turbulence modeling in an enriched discontinuous Galerkin framework*
Yu Lv
Mississippi State University, United States
Host(s): Matthias Ihme

*Regularity diagnostics applied to turbulent boundary layers*
Robert Kerr
University of Warwick, United Kingdom
Host(s): Perry Johnson and Jane Bae

*Wall-modeled large-eddy simulation of massively separated aircraft wake*
Oriol Lehmkuhl and George Ilhwan Park
Barcelona Supercomputing Center, Spain
University of Pennsylvania, United States
Host(s): Sanjeeb Bose and Parviz Moin

***Impact of transverse shear on turbomachinery endwall flows***
Jin Lee
United Technologies Research Center, United Sates
Host(s): Sanjeeb Bose

***Single-point structure tensors in rough-wall, non-equilibrium turbulent boundary layers***
Junlin Yuan and Giles Brereton
Michigan State University, United States
Host(s):  Aashwin Mishra and Gianluca Iaccarino

**11:20 AM**    **Further Discussion**

**11:45 AM**    **MULTIPHYSICS DATA-DRIVEN STUDIES AND NUMERICAL METHODS**
 **Overview**    **Gianluca Iaccarino**

***A novel framework for data-driven identification and analysis of intermittency and rare events in turbulent shear flows***
Peter J. Schmid and Oliver T. Schmidt
Imperial College of London, United Kingdom
California Institute of Technology, United States
Host(s): Aaron Towne and Philipp Hack

***Data-based estimates of adjoint operators for turbulent flow control***
Daniel Bodony
University of Illinois at Urbana-Champaign, United States
Host(s): Aaron Towne and Philipp Hack

***The suitability of hybrid meshes for LES***
Stefan Domino
Sandia National Laboratories, United States
Host(s): Lluis Jofre

***The influence of temperature non-uniformity on supersonic jet noise***
Patrick Tamm
NAVAIR Internal Flow Team, United States
Host(s): Guillaume Bres, Aaron Towne, and Sanjiva Lele

***Learning individual and collective strategies for flow navigation in unsteady flow environments***
Vamsi Spandan Arza
University of Twente, Netherlands
Host(s):  Lluis Jofre and Maxime Bassenne

***Analysis of numerical dissipation in entropy-stable schemes for turbulent flows***
Cory V. Frontin and Scott M. Murman
Massachusetts Institute of Technology, United States
NASA Ames Research Center, United States
Host(s): Lin Fu and Zhu Huang

*Shadowing-based adjoint sensitivity analysis for LES of a turbulent jet*
Patrick Joseph Blonigan
NASA Ames Research Center, United States
Host(s): Aaron Towne and Zhu Huang

*Optimizing nozzle shapes for jet noise reduction*
Zhong-Nan Wang, Qiqi Wang, Nisha Chandramoorthy, and Paul Tucker
Cambridge University, United Kingdom
Massachusetts Institute of Technology, United States
Host(s): Sanjeeb Bose and Aaron Towne

*Large-scale definition for the variational multiscale method based on spectral eddy-viscosity analyses*
Fabio Naddei, Marta de la Llave Plata, and Marc Massot
ONERA - The French Aerospace Lab, France
Ecole Polytechnique / Centre de Mathematiques Appliquees, France
Host(s): Eric Ching and Matthias Ihme

*Passive scalar mixing through shock-turbulence interactions: DNS, statistical and geometric analysis*
Ivan Bermejo-Moreno, Xiangyu Gao, and Jonas Buchmeier
University of Southern California, USA
Host(s): Lin Fu and Sanjiva Lele

*On the calibration of turbulence models for a siloxane MDM in the non-ideal regime and application to the robust optimization of turbine cascades*
Giulio Gori, Nassim Razaaly, and Pietro M. Congedo
Universite de Bordeaux, INRIA, France
Host(s): Aashwin Mishra and Gianluca Iaccarino

**12:30 PM**   **Further Discussion**

**12:45 PM**   **Lunch**

**1:45 PM**   **MULTIPHASE FLOWS**
**Overview**   **Ali Mani**

*Interscale energy transfer of liquid phase turbulence in a homogenous swarm of air bubbles rising in a vertical channel*
Chung Kei Chris Lai and Bruno Fraga
Los Alamos National Laboratory, United States
University of Birmingham, United Kingdom
Host(s): Michael Dodd and Ronald Chan

*Towards an Euler-Lagrange high-speed multiphase flow model*
Magnus Vartdal and Andreas Nygard Osnes
Norwegian Defence Research Establishment (FFI), Norway
University of Oslo, Norway
Host(s): Jeremy Horwitz and Ali Mani

*Confinement, enhancement, extremes and inversions in the mixing and transport of particles by rotating turbulent flows*
Andy Bragg and Rohit Dhariwal
Duke University, United States
Host(s): Jeremy Horwitz and Ali Mani

*Direct numerical simulation of homogeneous shear turbulence with finite-size bubbles/droplets*
Luca Brandt, Marco E. Rosti, and Anthony Ge
Royal Institute of Technology, Sweden
Linne FLOW Centre and SeRC, Sweden
Host(s): Michael Dodd and Suhas Suresh

*A hybrid MVA-LES approach for turbulent flows in porous media: a priori DNS analysis and subgrid model development*
Sourabh V. Apte
Oregon State University, United States
Host(s): Sadaf Sobhani and Matthias Ihme

*Electric-field effects on turbophoresis in particle-laden turbulent channel flows*
Mario Di Renzo
Politecnico di Bari, Italy
Host(s): Maxime Bassenne, Laura Villafañe, Perry Johnson, and Javier Urzay

*A dual-scale subgrid closure for LES of phase interfaces in turbulent flows*
Marcus Herrmann, Dominic Kedelty, and Thomas Ziegenhein
Arizona State University, United States
Host(s): Hanul Hwang

*Multiphase transport and particle deposition of sand ingestion for high temperature turbine blades*
Nishan Jain and Luis Bravo
University of Maryland, United States
US Army Research Laboratory, United States
Host(s): Dokyun Kim and Sanjeeb Bose

**2:35 PM**  **Further Discussion**

**2:50 PM**  **COMBUSTION**
**Overview**  **Matthias Ihme**

*Intrusive generalized chaos expansion on linearized Euler equations for uncertainty quantification of thermoacoustic instabilities*
Camilo F. Silva and Per Petterson
Technische Universitat Munchen, Germany
Uni Research CIPR, Norway
Host(s): Gianluca Iaccarino and Matthias Ihme

*A Bayesian approach for data assimilation and parameter estimation in combustion instabilities*
Hans Yu, Matthew Juniper, and Luca Magri
University of Cambridge, United Kingdom
Host(s): Jeffrey Labahn, Aashwin Mishra, and Matthias Ihme

*Exploration of the potential of deep learning for sub-grid scale flame surface estimation*
Corentin Lapeyre
CERFACS, France
Host(s): Aashwin Mishra and Thomas Jaravel

*Direct numerical simulation, analysis and advanced modeling of the evaporation of multiple fuel droplets in a hot turbulent flow*
Christophe Duwig, Giandomenico Lupo, and Andrea Gruber
Royal Institute of Technology, Linne FLOW Centre, Sweden
SINTEF Energy Research, Norway
Host(s): Thomas Jaravel, Pavan Bharadwaj, and Michael Dodd

*Effect of combustor liner wall angle on aerodynamics and convective heat transfer*
Georgi Kalitzin and Kalyana Gottiparthi
United Technologies Research Center, United States
Oak Ridge National Laboratory, UT-Battelle LLC, United States
Host(s): Sanjeeb Bose, Matthias Ihme, and Javier Urzay

*Scale dependence and modeling of heat release effects on subfilter turbulence in turbulent premixed combustion*
Jonathan F. MacArt and Michael E. Mueller
Princeton University, United States
Host(s): Matthias Ihme and Javier Urzay

*Characterization of scheme and model impacts on LES via DNS-assisted evaluation*
Ayaboe K. Edoh and Timothy Gallagher
ERC, Inc. Edwards Air Force Base, United States
ISS, Inc. Air Force Research Lab, United States
Host(s): Qing Wang and Matthias Ihme

*Simulation of reacting flows using observable Euler / Navier-Stokes equations*
Kamran Mohseni and Bahman Aboulhasanzadeh
University of Florida at Gainesville, United States
Host(s): Ali Mani and Javier Urzay

**3:40 PM** **Further Discussion**


**4:00 PM** **Adjourn**
**Coffee Break**

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