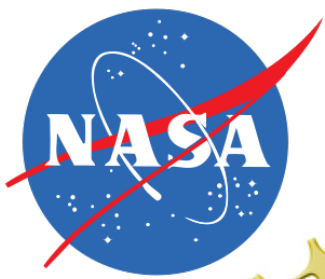# CENTER FOR TURBULENCE RESEARCH

Summer Research Opportunity

June 26-July 22, 2016

The Center for Turbulence Research invites applications for participation in its 16th biennial summer research program. The objective of the program is to promote development and evaluation of new ideas in turbulence research. It is expected that novel ideas and preliminary results generated during the summer program will be of sufficiently high caliber to lead to publications and to provide grounds for new research in the participants' home institutions.

Interested scientists may consider submitting proposals in broad areas of multi-physics turbulent flow research. Examples of broad research areas of current interest at CTR are: (i) Aerodynamics, including wall-modeling for LES of high-Reynolds number turbulent boundary layers, RANS and LES closures, high-speed boundary-layer transition physics, and flow control; (ii) Combustion, including turbulent-combustion modeling, multi-scale flame-turbulence interactions, high-pressure transcritical combustion, thermo-acoustic instabilities, and shock-induced mixing; (iii) Aero-acoustics, including formulations of impedance boundary conditions, along with airframe, jet and core noise; (iv) Multi-phase flows, including sub-filter modeling for primary atomization and particle-laden flows, modeling the generation of bubbles and drops, and multi-physical interactions in sprays; (v) Aerothermodynamics, including flow-structure interactions for hypersonic flight, shape optimization, radiation transport, space propulsion and power, and plasma turbulence; (vi) Numerical algorithms for turbulent flow simulations, including uncertainty quantification, numerical algorithms for emerging computer architectures, and novel data-mining techniques and information extraction from large datasets.

Participants will have the unique opportunity to make use of the Center's advanced numerical simulation technology including an unstructured code for multi-phase reacting flows in complex configurations. Computer expertise is not essential, and applications from experimentalists and theoreticians are encouraged. Research staff and graduate students, skilled in computer programming and familiar with the Center's post-processing systems, will provide support. Faculty applicants may propose to have one advanced doctoral student accompany them.

The available CTR databases include velocity, pressure, and scalar fields in several compressible and incompressible flows. Three-dimensional fields at several instants and some time series are available for each flow-configuration. Several large-memory multi- processor Linux systems, including the Certainty Cluster with 7000 cores and 120 GPU's, numerous graphics workstations and a visualization system with a large 9-tile display for 3-D data analysis will be available to the participants. Some participants in recent past summer programs have used their own databases and codes. Although most of the summer program will be based on existing data, a few new cases suggested by the participants may be carried out in preparation for the summer program.

Approximately seventy participants will be selected on the basis of their research proposals, the overall synergistic potential of the group, multi-institutional collaborations, and utilization of CTR's intellectual resources and infrastructure. Applicants are encouraged to identify faculty and research staff at CTR as potential collaborators. Fellowships will provide appropriate support, including travel and a stipend. **For more information regarding the format and previous research performed at CTR Summer Programs visit: http://ctr.stanford.edu.**

Application Procedure:

Applicants should submit a brief proposal stating the fundamental questions to be addressed, current state of the art, technical approach, goals for the summer research at CTR, the data and the computer codes to be employed, along with financial requirements and current curriculum vitae. Applications must be received by January 15, 2016. Awards will be announced on February 29, 2016. Housing arrangements will be made thereafter.

Submit applications in pdf format to: turbulence@stanford.edu

Center for Turbulence Research, Stanford University, Ph: (650) 736-0766

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