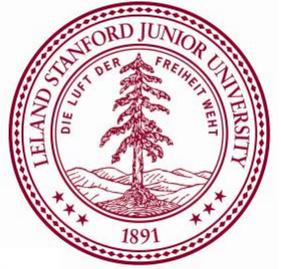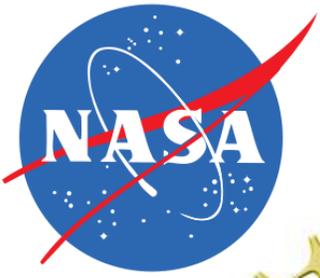# CENTER FOR TURBULENCE RESEARCH

Summer Research Opportunity

July 19-August 14, 2020

The Center for Turbulence Research invites applications for participation in its 18th biennial Summer Program. The objective of the Summer Program is to promote development and evaluation of new ideas in fluid mechanics with emphasis on turbulent flows. It is expected that the novel concepts and preliminary results generated during the Summer Program will be of sufficiently high caliber to lead to journal publications and to provide grounds for opening new and exciting lines of research in the community-at-large.

The Summer Program seeks to host studies that will introduce novel concepts at a fundamental level while envisioning long-term applicability for engineering analysis. Accordingly, proposals focusing on high-risk new concepts, whose first-ever deployment may be limited to canonical problems during the Summer Program, and which may provide opportunities applicable to realistic scenarios, are strongly encouraged.

Examples of broad research areas of current interest at CTR are: (i) compressible aerodynamics, including high-Mach-number (supersonic and hypersonic) flows, boundary layer transition, heat transfer, flow-structure interactions, and wall modeling for LES; (ii) multi-physics problems in turbulent flows, including multi-scale dynamics in turbulent combustion, aero-acoustics, multi-phase flows involving phase change, and plasmas; (iii) fundamental investigations of complex effects in fluid mechanics, including chemically reactive surfaces, flows with real-fluid thermodynamics, rarefied flows, and problems involving dispersed phases such as sprays and particle-laden turbulence; (iv) scalable and efficient numerical methods for multi-scale and multi-physics problems in fluid dynamics; (v) statistical analysis tools, including uncertainty quantification, novel data-mining techniques and physics learning from large datasets; and (vi) flow control for turbulent and transitional flows.

Computer expertise is not essential, and applications from experimentalists and theoreticians are encouraged. Applicants may request support from CTR research staff and graduate students skilled in computer programming and familiar with the Center's computational infrastructure. Faculty applicants may also propose to have one advanced doctoral student accompany them. Several large-memory multiprocessor Linux systems, high performance compute clusters with over 30,000 cores, GPU's, numerous graphics workstations and a large visualization system will be available to the participants.

Participants will be selected on the basis of the scientific novelty of their proposals, the overall synergistic potential of the group and multi-institutional collaborations, and the utilization of CTR's intellectual resources and infrastructure. Applicants are encouraged to identify faculty and research staff at CTR as potential collaborators. Graduate students applying to the program should be accompanied by their thesis advisors on-site throughout the entire Summer Program. Fellowships will provide appropriate support, including travel and a stipend.

Visit the CTR website http://ctr.stanford.edu for more information regarding the format and previous research performed at CTR Summer Programs.

Application Procedure:

Applicants should submit a brief proposal (no longer than 4 pages) stating: (i) fundamental questions to be addressed, (ii) how exactly the proposed work will improve the state-of-the-art, (iii) technical approach, (iv) a list of the on-site personnel that will be involved in the project, (v) goals for the summer research at CTR, and (vi) the data and the computer codes to be employed. Attached to the proposal should be an appendix with financial requirements and the CVs of the participants. Applications must be received by February 1, 2020. Awards will be announced on March 18, 2020. Housing arrangements will be made thereafter.

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