Opportunity Title: Next-Generation Computational Methods for Scalable Computing

Opportunity Reference Code: 0020-NPP-NOV23-LRC-AeroEng

Organization	National Aeronautics and Space Administration (NASA)
Reference Code	0020-NPP-NOV23-LRC-AeroEng
Application Deadline	11/1/2023 6:00:59 PM Eastern Time Zone

Description A candidate is sought to pursue ground-breaking research in the field of High Performance Computing (HPC) for large-scale computational fluids and other multidisciplinary aerospace applications.

Novel scalable scientific algorithms are needed to enable key NASA applications to exploit the computational power of massively parallel systems. This is especially true for the current tier of leading petascale machines and the road to exascale computing as HPC systems continue to scale up. These systems require unique scientific algorithms to hide network and memory latency, achieve very high computation-to-communication ratios, and minimize synchronization. Algorithms must be fault-tolerant, as the probability of component failure increases with scale and cannot be neglected. With the advent of heterogeneous computer nodes that employ a broad range of processing units, algorithms must be specifically designed and implemented to leverage the strengths of these architectures in order to maximize performance.

As HPC continues to play an ever-larger role in today's science and engineering disciplines, a broad range of research avenues is available. The selected candidate will conduct a leading-edge research program that will advance the state of the art in fluid dynamics computations on extreme-scale HPC systems to benefit a broad range of multidisciplinary NASA applications. Examples of research topics include optimization of both new and existing computational paradigms on emergent heterogeneous architectures, which may be composed of some combination of traditional CPUs, GPGPUs, MICs, ARMs, etc. Software development based on the use of high-level programming languages and auto-tuning to abstract the fundamental concepts of an algorithm, while improving portability of the software across systems with widely-varying hardware architectures are of interest. Advanced algorithms that drastically increase the ratios of flops/memory access and flops/communication are needed. Fault-tolerant schemes capable of recovering from isolated system failures will be essential. Other areas of research related to HPC systems may also be considered. The post-doctoral candidate must meet the following requirements: U.S. Citizenship; PhD degree in computer science, engineering, physics, or equivalent.

Location:

Langley Research Center
Hampton, Virginia

Field of Science: Aeronautics, Aeronautical or Other Engineering

Advisors:
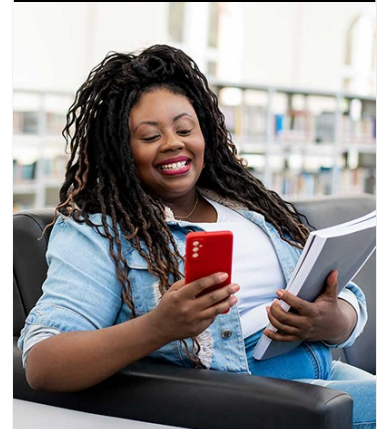
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Eligibility Requirements	• **Citizenship:** U.S. Citizen Only
	• **Degree:** Doctoral Degree.