Opportunity Title: Computational Materials Science Research - Multi-Scale Mode
Opportunity Reference Code: ARL-C-CISD-7633584411-NCCS

Organization DEVCOM Army Research Laboratory

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Description

About the Research

In recent years, computational design has become increasingly critical to the development of new materials. The overarching goal is to accelerate the development of new materials by significantly reducing development time and evaluation costs. To realize this goal, high-fidelity physical models at multiple scales are usually developed and combined into a single multi-scale/multi-physics model. With this process, analysis and optimization are possible. Computational analysis and design of materials is applicable across a wide range of materials science and technology areas.

Research opportunities exists for the development of computational methodologies (numerical methods and associated algorithms) that enable rapid creation of new high-fidelity multi-scale/multi-physics computer models of materials capable of utilizing modern extreme-scale computing environments. The success of multi-scale modeling hinges on the ability to combine at-scale models into a multi-scale model. However, few numerical methodologies and associated algorithms have been developed so far to enable such scale-bridging. Moreover, many at-scale models are extremely demanding computationally and render any multi-scale model utilizing them unsuitable for practical applications. While surrogate modeling allows reduction of this computational cost, most methodologies for surrogate modeling are global and thus characterized by a relatively high cost. New adaptive non-local surrogate modeling methodologies are needed, which can bring the computational cost down to tractable levels. Finally, at-scale models are frequently endowed with uncertainty due to various sources such as natural fluctuations, model parameters or model form. This uncertainty and natural variability must be consistently incorporated into multi-scale/multi-physics computer models in order to enable computational design of materials.

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About Network Cyber & Computational Sciences (NCCS)

Sciences to enable and ensure secure resilient communication networks for distributed analytics in Multi-Domain Operations.

About Army Research Directorate (ARD)

ARL's Army Research Directorate (ARD) focuses on exploiting concept development, discovery, technology development, and transition of the most promising disruptive science and technology to deliver to the Army fundamentally advantageous science-based capabilities through laboratory's 11 research competencies. This intramural research directorate also manages the laboratory's essential research programs, which are

flagship research efforts focused on delivering defined outcomes.

About ARL-RAP

The Army Research Laboratory Research Associateship Program (ARL-RAP) is designed to significantly increase the involvement of creative and highly trained scientists and engineers from academia and industry in scientific and technical areas of interest and relevance to the Army. Scientists and Engineers at the CCDC Army Research Laboratory (ARL) help shape and execute the Army's program for meeting the challenge of developing technologies that will support Army forces in meeting future operational needs by pursuing scientific research and technological developments in diverse fields such as: applied mathematics, atmospheric characterization, simulation and human modeling, digital/optical signal processing, nanotechnology, material science and technology, multifunctional technology, combustion processes, propulsion and flight physics, communication and networking, and computational and information sciences.

A complete application includes:

- **Curriculum Vitae or Resume**
- **Three References Forms**
  - An email with a link to the reference form will be available in Zintellect to the applicant upon completion of the on-line application. Please send this email to persons you have selected to complete a reference.
  - References should be from persons familiar with your educational and professional qualifications (include your thesis or dissertation advisor, if applicable)
- **Transcripts**
  - Transcript verifying receipt of degree must be submitted with the application. Student/unofficial copy is acceptable

If selected by an advisor the participant will also be required to write a **research proposal** to submit to the ARL-RAP review panel for :

- Research topic should relate to a specific opportunity at ARL
- The objective of the research topic should be clear and have a defined outcome
- Explain the direction you plan to pursue
- Include expected period for completing the study
- Include a brief background such as preparation and motivation for the research
- References of published efforts may be used to improve the proposal

A link to upload the proposal will be provided to the applicant once the advisor has made their selection.

Questions about this opportunity? Please email ARLFellowship@orau.org

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Point of Contact ARL

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.
- **Academic Level(s):** Faculty.
- **Discipline(s):**
  - **Chemistry and Materials Sciences** (12 👁)
  - **Computer, Information, and Data Sciences** (16 👁)
  - **Engineering** (27 👁)
  - **Mathematics and Statistics** (10 👁)
  - **Physics** (16 👁)
- **Age:** Must be 18 years of age