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Opportunity Title: Uncertainty Quantification and Verification Planning for Space Systems
Opportunity Reference Code: 0325-NPP-MAR26-JPL-Eng

Organization National Aeronautics and Space Administration (NASA)

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How to Apply All applications must be submitted in Zintellect

Please visit the NASA Postdoctoral Program website for application instructions and requirements: How to Apply | NASA Postdoctoral Program (orau.org)

A complete application to the NASA Postdoctoral Program includes:

1. Research proposal
2. Three letters of recommendation
3. Official doctoral transcript documents

Application Deadline 4/2/2026 6:00:59 PM Eastern Time Zone

Description **About the NASA Postdoctoral Program**

The NASA Postdoctoral Program (NPP) offers unique research opportunities to highly-talented scientists to engage in ongoing NASA research projects at a NASA Center, NASA Headquarters, or at a NASA-affiliated research institute. These one- to three-year fellowships are competitive and are designed to advance NASA's missions in space science, Earth science, aeronautics, space operations, exploration systems, and astrobiology.

Description:

Uncertainty quantification is a field with wide applicability to the design, development, and science return of space science missions. There is growing interest for the tools and practices of uncertainty quantification to be used to inform the engineering process in a more systematic way. Science systems engineering focuses on ensuring alignment between the design and operation of an engineered system and its top-level science objectives, but there has not been as much focus on connecting science objectives directly to the *development*of an engineered system.

Systems engineering practices emphasize verification: the process of ensuring that a system meets its requirements. This is a key part of ensuring quality and managing risk in the system development process, and is a major driver for the cost and schedule of every space mission. Traditionally, verification is treated as a binary outcome in that the system is tested against a set of criteria and determine to either meet or not meet it requirements. This can lead to expensive, time-consuming redesigns if requirements are not met. At present, there exists no widely-practiced quantitative methodology for modeling the system and using it to guide planning and verification in order to reduce uncertainty in a cost and time efficient way.

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The goal of this opportunity is to unify the two threads of uncertainty quantification and system verification with new research that implements cutting-edge uncertainty quantification methods into the systems engineering effort. In particular, we will incorporate uncertainty quantification to enable robust, probabilistic methods for ensuring performance relative to science goals. This requires extending the traditional verification paradigm to flow through to science modeling with uncertainty in a way that enables science goals to more directly inform requirements and engineering activities. By investing in this extended paradigm early in the design phases, we prioritize science objectives during test selection and design to bring time and cost savings to JPL and NASA systems engineering efforts. This will benefit flight projects currently in development, including potentially Surface Biology and Geology (SBG), Habitable Worlds Observatory, and a future Enceladus mission proposal.

This research lies at the intersection of systems engineering, uncertainty quantification, reliability analysis, computational modeling, goal-based experimental design, and statistical analysis. Primary areas of interest are in building, validating, and calibrating models that represent engineering systems and engineering processes, science traceability of engineering activities, decision-making under uncertainty for systems engineering decisions, uncertainty-informed digital twins, quantifying margins and sensitivities for measurement and test metrics, and providing recommendations for the scoping and planning of analysis and test activities over the development cycle.

We welcome applicants who are interested in working collaboratively with a larger team of systems engineers, verification and test engineers, technicians, and subject matter experts in order to develop the domain knowledge necessary for providing value to an ongoing systems engineering effort. The candidate will be a member of the Uncertainty Quantification and Statistical Analysis Group at JPL.

Field of Science: Engineering

Advisors:

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

Qualifications

The selected candidate must have a PhD degree in aerospace engineering, or related field; must have experience programming in the Unix/Linux environment using Python, Java, C/C++, or Julia; must have experience with algorithms, numerical techniques, and computational methods, specifically for uncertainty quantification, Bayesian statistics, and multivariate optimization; must have excellent writing and communication skills. Prior space systems engineering and V&V experience, including planning and execution of instrument/spacecraft tests is preferred.

Point of Contact Mikeala

Eligibility Requirements

- **Citizenship:** U.S. Citizen Only
- **Degree:** Doctoral Degree.