Opportunity Title: 2024 HPCMP Summer Program: Application and Validation of CREATE Helios & Lattice Boltzmann Method CFD for Full-Scale Ship Airwake Prediction

Opportunity Reference Code: HPCMP-HIP-2024-039

Organization	U.S. Department of Defense (DOD)
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How to Apply	Click on *Apply* at the bottom of the opportunity to start your application.
Description	**About High Performance Computing Modernization Program (HPCMP)**

The Department of Defense's (DoD) High Performance Computing Modernization Program (HPCMP) sponsors two summer research opportunities: the High-Performance Computing Internship Program (HIP) and the Faculty Immersion Experience (FIX). These 10-week experiences are offered in collaboration with more than a dozen DoD hosting organizations nationwide. Both programs seek to strengthen DoD and academic collaboration, enhance research capabilities, and encourage broader university-level participation in high-end computing.

The Department of Defense (DoD) established the High Performance Computing Modernization Program [hpc.mil] (HPCMP) as a department-wide program to provide DoD scientists, engineers, and acquisition engineering professionals with the computational resources needed to develop robust solutions to complete technical challenges.

About NAWCAD

The Applied Aerodynamics Branch at the Naval Air Warfare Center Aircraft Division (NAWCAD) supports development of new and improved aerodynamic technologies to fixed wing and rotary wing aircraft.

What will I be doing?

The primary goal of the project is to execute a verification and validation study focusing on validation of Kestrel Helios flow solver predictions against ship airwake survey data collected aboard USS San Diego (LPD 22) in August of 2021 by the NAVAIR Applied Aerodynamics Branch. The ultrasonic anemometer data was collected for a wide range of wind-over-deck (WOD) conditions using 48 anemometers arranged to map unsteady flow velocity over the flight deck. The CREATE Helios flow solver will be applied to model the airwake created by LPD 22 for the same WOD conditions recorded during experimental testing. Under the guidance of a mentor, you will collaborate with other team members involving a best practices study that will examine parameters such as grid density, turbulence modeling, gridding approaches (unstructured, Cartesian off body (COB), etc.), atmospheric boundary layer, and ship speed. Best practices will be transitioned to the ONR DIVE program as well as the many other aircraft and ship programs that seek CFD generated ship airwake models.
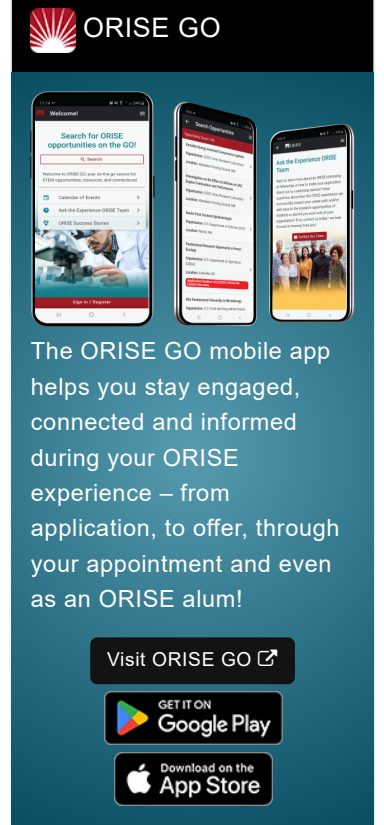
Why should I apply?

This internship will give you an opportunity to learn from and collaborate with scientists and engineers, and contribute to significant research, development, test, evaluation & acquisitions engineering activities, and develop critical skills and establish long-term connections, and gain a competitive advantage and improve long-term career opportunities.

Where will I be located? Patuxent River, Maryland

What is the anticipated start date? June 2024

What is the appointment length? This appointment is a 10-week summer research appointment. Appointments may be extended depending on funding availability, project assignment, program

rules, and availability of the participant.

What are the benefits?

- **Stipend:** Participants receive a monthly stipend to help defray living expenses during the appointment. Stipend rates are determined by HPCMP based on the participant's education level.
- **Dislocation Allowance:** A dislocation allowance may be provided for participants who relocate more than fifty miles, one-way, to the designated host site. This includes roundtrip domestic travel to/from the host location. Participant is responsible for and local transportation prior to arriving at the designated host site.
- **Professional Travel:** Participants may be eligible for reimbursement of pre-approved professional travel expenses related to the educational goals of the designated opportunity.
- **Health Insurance:** Participants may be eligible to enroll in ORISE health insurance to cover medical, dental and vision insurance.

ABOUT ORISE

This program, administered by Oak Ridge Associated Universities (ORAU) through its contract with the U.S. Department of Energy (DOE) to manage the Oak Ridge Institute for Science and Education (ORISE), was established through an interagency agreement between DOE and DoD. Participants do not enter into an employee/employer relationship with ORISE, ORAU, DoD or any other office or agency. Instead, you will be affiliated with ORISE for the administration of the appointment through the ORISE appointment letter and Terms of Appointment. Proof of health insurance is required for participation in this program. Health insurance can be obtained through ORISE. For more information, visit the ORISE Research Participation Program at the U.S. Department of Defense.

Qualifications   Bachelor's degree or higher in Aerospace or Mechanical Engineering. Applicant must have basic understanding of aerodynamics and numerical methods, preferably with a knowledge of computational fluid dynamics. Rotary wing experience is desired, though not required.

Preferred Skills:

- Familiar with at least 1 CFD code (e.g. Kestrel, Helios, Overflow, OpenFOAM, STAR-CCM+)
- Familiar with post-processing software (e.g. Ensight, Tecplot, Paraview, Matlab)
- Proficient in at least 1 programming language (e.g. Python, C/C++, Fortran, Matlab)

Applicants need to meet the following eligibility criteria at the time of application:

- Be a U.S. citizen.
- Be at least 18 years of age.
- Pursuing a bachelor's, master's, doctoral degree or received within the last five years in a science, technology, engineering or mathematics (STEM) discipline.
- Have a cumulative GPA of 3.0 or higher on a 4.00 scale.

Applicants should be able to pass a National Agency Check and Inquiries (NACI) security investigation should they be selected and accept the internship offer.

A complete application consists of:

- Zintellect Profile
- Educational and Employment History
- Essay Questions (goals, experiences, and skills relevant to the opportunity)

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- Resume (PDF)
- Transcripts/Academic Records - For this opportunity, an official transcript or copy of the student academic records printed by the applicant or by academic advisors from internal institution systems may be submitted. Click here for detailed information about acceptable transcripts.
- One recommendation - We encourage you to contact your recommender(s) as soon as you start your application to ensure they are able to complete the recommendation form and to let them know to expect a message from Zintellect. Recommenders will be asked to rate your scientific capabilities, personal characteristics, and describe how they know you. You can always log back in to your Zintellect account and check the status of your application.

Submitted documents must have all social security numbers, student identification numbers, and/or dates of birth removed (blanked out, blackened out, made illegible, etc.) prior to uploading into the application system. All documents must be in English or include an official English translation. If you have questions, send an email to HPCMP@orise.orau.gov. Please list the reference code of this opportunity in the subject line of the email. Please understand that ORISE does not review applications or select applicants; selections are made by the sponsoring agency identified on this opportunity. All application materials should be submitted via the "Apply" button at the bottom of this opportunity listing. Please do not send application materials to the email address above.

Connect with ORISE...on the GO! Download the new ORISE GO mobile app in the Apple App Store or Google Play Store to help you stay engaged, connected, and informed during your ORISE experience and beyond!

Eligibility Requirements	- **Citizenship:** U.S. Citizen Only
	- **Degree:** Bachelor's Degree, Master's Degree, or Doctoral Degree received within the last 60 months or currently pursuing.
	- **Overall GPA:** 3.00
	- **Discipline(s):**
	  ○ **Computer, Information, and Data Sciences** (17 👁)
	  ○ **Engineering** (27 👁)
	  ○ **Mathematics and Statistics** (11 👁)
	  ○ **Physics** (16 👁)
	  ○ **Science & Engineering-related** (2 👁)
	- **Age:** Must be 18 years of age
	- **Veteran Status:** Veterans Preference, degree received within the last 120 month(s).