
Job Description

Job Vacancy : Applied Mathematician/ Numerical Optimization Specialist

Date: 03/09/2023

Location: Madison, Wisconsin

Salary: Highly Competitive Plus Benefits

Hours: Full Time

Contract Type: Permanent

Reporting to: Chief Technology Officer

About Type One Energy

Fusion energy is the clean power at the center of stars. Mastered here on earth, its unique advantages will rapidly disrupt carbon-based fuels to become the primary form of baseload power on the planet.

Type One Energy is a fusion energy startup applying innovations in additive manufacturing, quasi-symmetry, and HTS magnets to commercialize an economical stellarator power plant. The stellarator is an innovative marriage of elegant physics, engineering artistry, and practical utility.

Founded by experts and technology from the University of Wisconsin, Type One Energy is a world leader in stellarator R&D with the mission to provide clean and affordable fusion power to every city across the globe.

In collaboration with our public and private partners, we are uniting the outstanding operation of a stellarator with breakthroughs in theory, additive manufacturing, and high temperature superconducting magnets. We are producing an economical fusion power plant to be deployed worldwide in the shortest amount of time.

About The Role

Type One Energy is seeking an Applied Mathematician who is an expert in scientific computing and high-dimensional optimization. The role of the Applied Mathematician/Numerical Optimization Specialist in the company, will be to contribute to developing the team's theoretical and computational tools for stellarator optimization.

Our stellarator optimization codes are expected to build on the accomplishments of the stellarator design codes STELLOPT and SIMSOPT. The central responsibility of the numerical optimization specialist will be to develop cutting-edge numerical methods for its optimization libraries and for the physics codes it relies on. The optimization specialist will focus on methods that are well-suited for the high dimensional parameter space the Type One optimization team operates in. Examples of these

include gradient based optimization, and design numerical methods for obtaining the required gradients efficiently and with high accuracy. This may involve rewriting and improving parts of legacy physics codes the Type One optimization team uses.

The scientific software used by our team is primarily written in Fortran, C++, Julia, and Python, so candidates with proficiency in these languages will be preferred. Experience with distributed memory (MPI) and shared memory (OpenMP) parallel programming is expected. Knowledge of mixed-language programming is an advantage, and experience with other parallel programming models is also desirable, as is experience with computer architectures based both on GPUs and CPUs. Familiarity with stellarator physics is not necessary.

Responsibilities

- Design and implement optimization methods for large-scale, distributed stellarator optimization using state-of-the-art algorithms using standard software development best practices with rigorous tests.
- Perform optimization calculations and analyze output to identify components for improvement.
- Adapt current physics software for optimization/write new physics software suitable for optimization.
- Work across multiple teams to design flexible interfaces and data structures that meet the needs of integrated physics and engineering optimization.
- Write technical documentation and provide support to other optimization users.
- Present regular status updates and plans for new optimization features.

Required Qualifications and Experience

- Master's degree in computer science or Applied/Numerical Mathematics with industry experience in optimization.
- A doctorate in Computer Science or Applied/Numerical Mathematics focused on optimization is desirable.
- Expertise in Julia and/or Python.
- Proficiency in C++ and/or Fortran and language interoperability.
- Proficiency in parallel programming models such as MPI and multi-threading.
- Experience with high-performance computing.
- Knowledge of software development best practices.
- Excellent written and oral communication skills.
- Ability to work as part of a dynamic team.
- Proficiency in GPU computing, particularly with Julia is also desirable .

To Apply

Please send your CV and cover letter to Sam Belazka at sam.belazka@typeoneenergy.com and for more information please visit our website at www.typeoneenergy.com.

Also, as an example of previous work, applicants may submit relevant journal publications they authored, or the source code (or a link to it) and brief description of a scientific computing project they have worked on.