

OOKAMI PROJECT APPLICATION

Date: 05/05/2021

Project Title: Lagrangian Particle Models and Simulations

Usage:

- Testbed: X

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Usage Description:

Our research group is currently focused on developing numerical algorithms and implementing new physics models in the Lagrangian Particle hydro/MHD code and electromagnetic code SPACE, and their applications to problems in thermonuclear nuclear fusion, laser-plasma wakefield acceleration. These include performing 3D simulations of the ablation of pellets and Shattered Pellet Injection (SPI) fragments in tokamaks using the Lagrangian Particle code and simulation of laser-plasma interactions and wakefield acceleration experiments using SPACE. Both codes are massively parallel and use scalable libraries for maximizing parallel performance in the simulation of large scale problems. Having the access to high-performance computing facilities is extremely important for our research, especially for simulating SPI which could involve hundreds of pellet fragments and more than 10^7 particles. The outstanding computational ability of Ookami would greatly benefit us from generating productive results efficiently and boosting our research.

Computational Resources:

- Total node hours per year: 12,000 hours
- Size (nodes) and duration (hours) for a typical batch job: A typical batch job usually takes 2-3 nodes and finishes within 24-48 hours.
- Disk space (home, project, scratch):

home: 30 GB,

project: 8 TB,

scratch: 20 TB.

Personnel Resources: No personnel resources needed

Required software:

- VisIt visualization software: <https://wci.llnl.gov/simulation/computer-codes/Visit>

If your research is supported by US federal agencies:

- Agency: US DOE's SciDAC Center for Tokamak Transient Simulations
- Agency: US DOE, Office of Science, High Energy Physics, DE-SC0014043