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Particle Laden Turbulence in a Radiation Environment Using a Portable High Preformace Solver Based on the Legion Runtime System[1]

HILARIO TORRES, GIANLUCA IACCARINO, Stanford University — Soleil-X is a multi-physics solver being developed at Stanford University as a part of the Predictive Science Academic Alliance Program II. Our goal is to conduct high fidelity simulations of particle laden turbulent flows in a radiation environment for solar energy receiver applications as well as to demonstrate our readiness to effectively utilize next generation Exascale machines. The novel aspect of Soleil-X is that it is built upon the Legion runtime system to enable easy portability to different parallel distributed heterogeneous architectures while also being written entirely in high-level/high-productivity languages (Ebb and Regent). An overview of the Soleil-X software architecture will be given. Results from coupled fluid flow, Lagrangian point particle tracking, and thermal radiation simulations will be presented. Performance diagnostic tools and metrics corresponding the the same cases will also be discussed.

[1]US Department of Energy, National Nuclear Security Administration

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