H5PART: A PORTABLE HIGH PERFORMANCE PARALLEL DATA INTERFACE FOR ELECTROMAGNETICS SIMULATIONS

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Abstract

The very largest parallel particle simulations, for problems involving six dimensional phase space and field data, generate vast quantities of data. It is desirable to store such enormous data-sets efficiently and also to share data effortlessly between other programs and analysis tools. With H5Part we defined a very simple file schema built on top of HDF5 (Hierarchical Data Format version 5) as well as an API that simplifies the reading and writing of the data to the HDF5 file format. Our API, which is oriented towards the needs of the particle physics and cosmology community, provides support for three types of common data types: particles, structured and unstructured meshes. HDF5 offers a self-describing machine-independent binary file format that supports scalable parallel I/O performance for MPI codes on computer systems ranging from laptops to supercomputers. The following languages are supported: C, C++, Fortran and Python. We show the easy usage and the performance for reading/writing terabytes of data on several parallel platforms. H5part is being distributed as Open Source under a BSD-like license.

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