

Development of an SPH code which works on the PEZY-SC devices and application to the giant impact

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Lately, heterogeneous HPC clusters which have CPUs and accelerators, such as GPUs, have been getting more common.

However, to develop such codes requires highly complex parallelization techniques and kernel codes for the accelerators.

Thus, it is quite difficult to develop high-performance codes which work on such a cluster.

In order to get rid of this complexity, recently, we develop a software named Framework for Developing Particle Simulator (FDPS), which automatically parallelise arbitrary particle-base schemes by using both OpenMP and MPI.

FDPS version 2.0 (or higher) also has the so-called ``Multi Walk mode" to use accelerators.

We developed a smoothed particle hydrodynamics (SPH) code, which used FDPS and works on multiple PEZY-SC devices.

Among several versions of SPHs, we have implemented the standard SPH and the Density Independent SPH.

A PEZY-SC is an accelerator which has advantages to the other accelerators in terms of its performance per power.

We also compared the speed-up efficiency and found that our code is about 30 times faster in single precision than a code which works only on CPUs.

We will show the results of numerical simulations of the giant impact problem carried out by the code.