

10th International Conference "Distributed Computing and Grid Technologies in Science and Education" (GRID'2023)



Contribution ID: 336

Type: **not specified**

The Impact of Data Aligning on The Efficiency of a Parallel PIC Code for Numerical Simulation of Plasma Dynamics in Open Trap

Tuesday, 4 July 2023 14:15 (15 minutes)

Particle-in-Cell (PIC) simulation of high-beta plasmas in an axisymmetric mirror machine is of interest because of a new proposal for a plasma confinement regime with extremely high pressure, equal to the pressure of the magnetic field, so-called diamagnetic confinement. The results of simulations can be used for the development of aneutronic fusion.

In this work, we will show our latest PIC code developed for the numerical simulation of the fully ionized hydrogen plasma with the injection of the ions and electrons inside the cylindrical trap. This is MPI-based Fortran code with data aligning for efficient AVX2/AVX512 auto-vectorization. We will present the role of manual and automatic data aligning on different programs' performance characteristics with different versions of Fortran compilers.

This work was supported by the Russian Science Foundation (project 19-71-20026).

Summary

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Session Classification: Distributed Computing and HPC Applications

Track Classification: Distributed Computing and HPC Applications