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## MHD simulation of the planetary magnetospheres on the various scalar type supercomputer systems

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In the recent day, more than 85% of the "top 500" supercomputer systems in the world adopt the "64-bit x86" processor architecture. However it is often mentioned that the performance of electromagnetic fluid codes is not good on the scalar type computer as compared to the vector type computer. Thus the aim of this present study is to make performance tuning and measurement of MHD simulation code of the planetary magnetospheres on the massively parallel supercomputer systems with various types of scalar processors. In this study we use the T2K open supercomputer at University of Tokyo (AMD Opteron processor), SR16000 at Kyushu University (IBM Power6 processor), and FX1 (Fujitsu SPARC64VI) and HX600 (AMD Opteron) at Nagoya University.

In this presentation the MHD simulation model is performed by three decomposition methods for parallelization and one cache tuning method to find out which method is best for MHD model. As the results of these runs, we have obtained over 10% of peak performance efficiency using the T2K open supercomputer and we obtained much better performances with SR16000 and FX1, HX600. In particular we found that the two-dimensional decomposition of MHD model is suitable for T2K and for SR16000 and FX1 cache tuned three-dimensional decomposition achieved best performance. In this study we will show the results of performance measurements and tuning techniques for MHD simulation code of the planetary magnetospheres with scalar type supercomputer in detail. Finally we will present the latest simulation results of global planetary magnetosphere with high special resolution.

Keywords: MHD, planetary magnetosphere, high performance computing