

Lighthouse and Regular Simulation Projects

Noriyoshi Nakajima

NIFS

The Computational Simulation Centre (CSC) is one of the three sub-projects of the IFERC (International Fusion Energy Research Centre). The operation of the supercomputer of CSC, named “Helios/Roku-chan” was started from January 2012, and three months from January to March have been devoted to the “Lighthouse projects”, whose main purpose is to show the possibility to exploit new research fields or frontier of the magnetic fusion simulations by using “Helios/Roku-chan”. From April 2012, regular or normal simulation projects started based on the evaluation of the proposed simulation projects by the Standing Committee and on the supports by IFERC-CSC team. The period of the 1st cycle of the simulation projects is April 9 to November 14.

In the Lighthouse project, 4 projects (2 from EU and 2 from Japan) have been selected, and the results show that global gyrokinetic continuum simulations with comprehensive physics become feasible for large tokamaks like JET, that the scaling of ion turbulence transport can be obtained beyond existing device sizes, that global electrostatic gyrokinetic simulations based on PIC become possible in ITER, and that hybrid simulations composed of alpha and deuteron beam (in PIC part) and background MHD (in fluid part) become possible in ITER. Therefore, it is considered that verification and validity tests of the comprehensive simulation codes up to fairly large actual device sizes are possible, and some predictions of ITER burning plasmas including alpha and of the turbulence transport level of ITER becomes possible. Moreover, through the efforts by both project participants and IFERC-CSC team, a lot of knowledge or information on large node jobs using almost full system or nodes have been obtained, whose knowledge or information is reflected in the present operation.

In the regular or normal simulation projects, interim activity reports by using “Helios/Roku-chan” on presentations in conference/workshop/meeting/seminar/symposium and publications including submitted ones have been submitted by Principal Investigators on the last October. The results show that the number of presentations is 41 for EU and 42 for Japan, and the number of publications is 19 for EU and 13 for Japan. Thus, it is recognized, in spite of a limited period (from 4/9 to 10/1), that many activities have been reported, and that activities of Japan are comparable with those of EU.