Integrated Simulation Based on TASK Code

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In order to predict the behavior of burning plasmas and to develop a scheme to control them, a simulation code system which integrates various theory-based models and large-scale simulations is strongly desired. For this purpose, we have started the activity of "Burning Plasma Simulation Initiative" which stimulates the collaboration among universities, NIFS and JAERI. One of the first targets of this activity is to propose a common data-interface between the existing and coming simulation codes and to develop a reference core code based on the TASK code which has been developed in Kyoto University and will be available as an open source code.

The TASK code is composed of several modules for equilibrium (EQ), transport (TR), Fokker-Planck (FP), ray-tracing (WR), full wave (WM), wave dispersion (DP), data interface (PL), and common libraries. Each module works now, but the data interface is under reconstruction. Some of recent results of the TASK code, such as dependence of the internal transport barrier formation on the bootstrap current models, evaluation of electron cyclotron current drive for neoclassical tearing mode stabilization, and analysis of Alfven eigenmodes in a reversed configuration.

We are planning several extensions of the modules. One is a new transport module, TX, which solves the flux averaged fluid equation and describes the toroidal and poloidal plasma rotation and the radial electric field. The analysis of edge transport barrier formation is also in the scope of this module. Another is the full wave analysis of global stability, WA. Preliminary results will be presented. Extension to the analysis of helical system will be also discussed.