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Burning Plasma Simulation Initiative: BPSI

2005/02/07
Version 1.0
Simulations: Detailed Simulation of Individual Phenomenon

Structure: Structural, Zonal Flow, ...

Theory: Better Understanding in Nonlinear Physics

Experiments: Significant Progress in Diagnostics

Background
Organized development of simulation system

Gradual increase of understanding and accuracy

How can we do?

Reasonable computer resources

Reasonable accuracy

Startup & sustenance & transients events & termination

Whole discharge

Whole plasma

Simulation describing a burning plasma:

What is needed?

To develop reliable and efficient schemes to control them

Why needed?

Burning Plasma Simulation
BPS! Working Group

Research Collaboration among Universities, NIFS and JAE RI

BPS! Burning Plasma Simulation Initiative
Advanced techniques of computer science

Core-SOL interface

Transport in the presence of magnetic islands

Transport during and after a transient MHD events

Space scales (e.g.)

New physics in interactions of phenomena with different time and scales

Helical configuration included

Reference core code, task

Common interface for data transfer

Framework for collaboration of various plasma simulation codes

Targets of BPSI
- Only for meeting support at present
  - US-Japan JIF Workshop from JSPS (A. Fukuyama, Kyoto U)
  - Research collaboration of JAERI (A. Fukuyama, Kyoto U)
  - Research collaboration of NIFS (Y. Nakamura, Kyoto U)
  - Research collaboration of RIAI, Kyushu U (M. Yagi, Kyushu U)
  - Part of Grant-in-Aid from MEXT (S. Itoh, Kyushu U)
  - Grant-in-Aid from JSPS (M. Yagi, Kyushu U)

Support from Various Resources

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Meetings •

Support •
TASK: Core code of BpSI for ITER, JT-60, LH, and small machines

TOPICS: Transport Analysis and Predictive Simulation for JT-60

Structure of BpSI
Full Integrated Simulation of burning plasmas

Integrated Simulation including startup and termination

3rd Stage

Integrated Simulation in 3D helical configuration

Direct numerical simulation Validation of modules with experimental results

Global Integrated Simulation (Core+Edge, Transport+RF+MHD, ...)

Integration of existing and newly-developed modules

2nd Stage

3D helical configuration

Transport simulation in 3D helical configuration

Integrated Simulation of multi-physics

Development of standard dataset and module interface

1st Stage

Status of BPSI