US-Japan Joint Institute for Fusion Theory Workshop on

Innovations and co-designs of fusion simulations towards extreme scale computing

August 20-21, 2015
Nagoya University, Nagoya, Japan

Venue
Meeting room, 1F, Engineering and Science Bldg., Nagoya University

Program
August 20 (Thursday)

Questions for all talks to address:

1. What are the challenges (computational, physics, algorithmic, data management, etc.) to achieve mission/program impact?
2. Are there challenge topics where collaboration can help?

Additional guidelines:

- Please keep in mind that this is a joint workshop with computational scientists. Please do not get into too much physics details, but discuss more about the computational side as listed above.
- Please leave 10 minutes after each talk for discussion of these computational questions.
- Session chairs will summarize these discussions.

09:00 – 09:15 Opening T.-H. Watanabe and C. S. Chang

Leadership-class and exascale computing (Chair: C. S. Chang)

09:15-10:00 Jeff Vetter (ORNL): Architecture trends, performance prediction and co-design tools

10:00-10:45 Mitsuhisa Sato (Riken): Exascale computing project in Japan (Break)
11:00-11:30  Jack Wells (ORNL): Leadership-computing architecture and the role of computing centers
Lunch break 11:30 AM – 1:00PM

Fusion plasma simulations at extreme scale (I) (Chair: Yasushi Todo)
13:00-13:30  Yasuhiro Idomura (JAEA): Full-f gyrokinetic simulations
13:30-14:00  C. S. Chang (PPPL): Full-f Gyrokinetic PIC and turbulence
14:00-14:30  David Green (ORNL): RF simulation
14:30-15:00  Shinya Maeyama (Nagoya Univ.): Gyrokinetic turbulence simulation
15:00-15:30  Frank Jenko (UCLA): Grid-based gyrokinetics at the exascale: Goals, obstacles, and new ideas

(Break)

Scalable algorithms, tools, and software engineering at extreme scale (Chair: Jack Wells)
16:00-16:30  David Bernholdt (ORNL): Programing environment and software engineering at extreme scale
16:30-17:00  Toshiyuki Imamura (Riken): Numerical software project
17:00-17:30  Ed D'Azevedo (ORNL): Scalable Algorithms

17:30-18:00  Group discussion on the workshop questions, with summary by session chairs.

Workshop dinner
18:00-20:30  Chez Jiroud (1F, E&S Bldg, Nagoya University)
(Fee: 5000yen; please confirm your participation in advance)

August 21 (Friday)

Data management and visualization (Chair: David Bernholdt)
09:00-09:30  Kenji Ono (Riken): Visualization and workflow
09:30-10:00  Scott Klasky (ORNL): Data management
10:00-10:20  Takuma Kawamura and Yasuhiro Idomura (JAEA): Remote visualization of massive data using particle-based volume rendering

(Break)

Performance prediction and optimization  (Chair: Yasuhiro Idomura)
10:50-11:20  Pat Worley (ORNL): Application performance engineering
11:20-11:40  Yuichi Asahi (JAEA): Optimization of fusion plasma codes
11:40-12:00  Masanori Nunami (NIFS): Optimization of a particle code

Lunch (12:00 – 13:30)

Material simulations at extreme scale  (Co-Chair: Atsurhi M. Ito / Brian Wirth)
13:30-14:00  Brian Wirth (U. Tennessee): Material science for fusion
14:00-14:30  Atsushi M. Ito (NIFS): Fusion material simulations
14:30-15:00  Yoshihide Yoshimoto (U. Tokyo): Computational materials physics
15:00-15:30  Tomoaki Suzudo (JAEA): Modeling of fusion material degradation

(Break)

Fusion plasma simulations at extreme scale (II)  (Chair: T.-H. Watanabe)
16:00-16:30  Masahori Nunami (NIFS) and Toshiyuki Shimizu (Fujitsu): Numerical Simulation Research in NIFS and Fujitsu’s New Supercomputer
16:30-17:00  Steve Jardin (PPPL): MHD/Fluid simulations
17:00-17:30  Yasushi Todo (NIFS): PIC-MHD hybrid simulation for energetic particle modes
17:30-18:00  Group discussion: (Develop throughout/summarize here.)
   • Requirements for leadership facilities.  Gaps? Data services support?
   • Opportunities for Fusion application – exascale hardware co-design.
   • Opportunities for “mini-app” definition and extraction

Closing