

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