## BOUT++2023 Workshop Agenda
January 9-11, 2023

Hertz Hall, University of California Livermore Collaboration Center, Eastgate Drive, Livermore, CA - Conference Room Point Reyes

Time zone for remote presenters: Blue for UK/EU, Red for Korea/China, and Green for USA.

### Monday, January 9, 2023

#### Day 1 - Welcome and BOUT++ Overview

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Speaker/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:00 AM</td>
<td>Arrive at Hertz Hall (refer to workshop website for directions, in necessary) BOUT++ Workshop- badging, wireless accounts setup and morning hospitality</td>
<td>All</td>
</tr>
<tr>
<td>8:45 AM</td>
<td>Welcome</td>
<td>William Evans/Harry Mclean, LLNL</td>
</tr>
<tr>
<td>8:55 AM</td>
<td>Administrative discussion</td>
<td>Xueqiao Xu, LLNL</td>
</tr>
</tbody>
</table>

#### Day 1 - SESSION 1

**Overview and Introduction - Xueqiao Xu, Chair**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Speaker/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 AM</td>
<td>Latest developments in BOUT++ boundary plasma turbulent transport simulations</td>
<td>Xueqiao Xu, LLNL</td>
</tr>
<tr>
<td>9:30 AM</td>
<td>Diagnosing turbulence in the Tokamak divertor using STORM</td>
<td>Nick Walkden, FN (Remote, UK)</td>
</tr>
<tr>
<td>10:00 AM</td>
<td><strong>Break</strong>/group photos</td>
<td>All</td>
</tr>
<tr>
<td>10:30 AM</td>
<td>Overview of the BOUT++ Code Structure</td>
<td>Ben Dudson, LLNL</td>
</tr>
<tr>
<td>11:30 AM</td>
<td>Tokamak disruption simulation and application of BOUT++</td>
<td>Xianzhu Tang, LANL</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Lunch</td>
<td></td>
</tr>
</tbody>
</table>

#### Day 1 - SESSION 2

**Code Development & Applications - Xianzhu Tang, Chair**

<table>
<thead>
<tr>
<th>Time</th>
<th>Activity</th>
<th>Speaker/Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>2:00 PM</td>
<td>A BOUT++ Extension For Full Annular Tokamak Edge MHD And Turbulence Simulations</td>
<td>Seto Haruki, QST</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Small ELM dynamics and its impact on the SOL width scaling</td>
<td>Nami Li, LLNL</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Linear simulation of kinetic Peeling-Ballooning mode with bootstrap current under the BOUT++ Gyro-Landau-fluid code</td>
<td>Pengfei Li, PKU (Remote, China)</td>
</tr>
<tr>
<td>3:30 PM</td>
<td><strong>Break</strong></td>
<td>All</td>
</tr>
<tr>
<td>4:00 PM</td>
<td>Global gyrofluid simulations of turbulence in tokamak plasmas</td>
<td>Sehoon Ko, KFE (Remote, Korea)</td>
</tr>
<tr>
<td>4:30 PM</td>
<td>The progress of the model development on ELM control with RMP and RF waves in ASIPP</td>
<td>Tianyang Xia, ASIPP (Remote, China)</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>Discussions</td>
<td></td>
</tr>
<tr>
<td>5:30 PM</td>
<td>Adjourn Day 1</td>
<td></td>
</tr>
</tbody>
</table>

Sponsor: Lawrence Livermore National Laboratory
Organizing Co-Committee Chair: Xueqiao Xu (925) 423-7578, Ben Dudson (925) 423-1110
Meeting Coordinator: Lara Ahuna (925) 422-7446 Janet Garcia (925) 423-4017
LLNL No.: LLNL-POST-842811: LLNL-MI-843628
Prepared by LLNL for USDOE SC-FES under Contract DE-AC52-07NA27344
https://bout.llnl.gov/workshops/2023
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**Tuesday, January 10, 2023**

<table>
<thead>
<tr>
<th>Time</th>
<th>Event</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td>Arrival at Hertz Hall <em>(refer to workshop website for directions, in necessary)</em></td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>BOUT++ Workshop Badging <em>(if you did not attend Day 1) morning hospitality</em></td>
<td></td>
</tr>
<tr>
<td><strong>Day 2 - Solvers</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9:00 AM</td>
<td>StyleGAN as an AI Deconvolution Operator for Large Eddy Simulations of Turbulent Plasma Equations in BOUT++</td>
<td>Jony Castagna, UKRI-STFC</td>
</tr>
<tr>
<td>9:30 AM</td>
<td>SiMLInt --- Simulation and Machine Learning Integration</td>
<td>Moritz Linkmann, Univ. of Edingburgh (Remote, UK)</td>
</tr>
<tr>
<td>10:00 AM</td>
<td>Autonomous Multiscale Simulations</td>
<td>Peer-Timo Bremer, LLNL</td>
</tr>
<tr>
<td>10:30 AM</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>11:00 AM</td>
<td>BOUT++ electromagnetic turbulence simulations of edge plasma dynamics during thermal quench</td>
<td>Ben Zhu, LLNL</td>
</tr>
<tr>
<td>11:30 AM</td>
<td>Physics of Turbulence Spreading and SOL Broadening</td>
<td>Patrick Diamond, UCSD (Remote, USA)</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Lunch</td>
<td>All</td>
</tr>
<tr>
<td><strong>Day 2 - SESSION 1</strong> AI/ML methods and SOL Broadening – Ben Dudson, Chair</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Day 2 - SESSION 2</strong> ITER and Fusion Pilot Plant - Phil Snyder, Chair</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Characterization of Turbulence and Transport in a Tokamak Power Plant</td>
<td>Chris Holland, UCSD (Remote, USA)</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Core-Edge Integration with Radiative Scenarios</td>
<td>Livia Casali, UTK (Maybe remote, USA)</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Identification of multi-scale MHD and turbulence and their role in setting the diverter heat flux width in wide-pedestal quiescent H-mode</td>
<td>Zeyu Li, GA (Remote, USA)</td>
</tr>
<tr>
<td>3:30 PM</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>4:00 PM</td>
<td>Divertor Modelling for SPARC</td>
<td>Thomas Body, CFS</td>
</tr>
<tr>
<td>4:30 PM</td>
<td>Discussions</td>
<td></td>
</tr>
<tr>
<td>5:30 PM</td>
<td>No Host Dinner (optional)- TBD</td>
<td>All</td>
</tr>
<tr>
<td>7:30 PM</td>
<td>After dinner</td>
<td></td>
</tr>
</tbody>
</table>
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### January 9-11, 2023

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**Wednesday, January 11, 2023**

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Venue</th>
</tr>
</thead>
<tbody>
<tr>
<td>8:30 AM</td>
<td>Arrival at Hertz Hall (refer to workshop website for directions, in necessary) BOUT++ Workshop Badging (if you did not attend Day 1 or 2) and morning hospitality</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Day 3 - SESSION 1</strong></td>
<td></td>
</tr>
<tr>
<td>9:00 AM</td>
<td>BOUT++ for stellarator applications</td>
<td>Brendan Shanahan, MPIPP (Remote, Germany)</td>
</tr>
<tr>
<td>9:30 AM</td>
<td>Overview over the edge fluid turbulence code GRILLIX</td>
<td>Andreas Stegmeir, MPIPP (Remote, Germany)</td>
</tr>
<tr>
<td>10:00 AM</td>
<td>The effect of divertor particle sources on scrape-off-layer turbulence</td>
<td>Qian Xia, UKAEA (Remote, UK)</td>
</tr>
<tr>
<td>10:30 AM</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>11:00 AM</td>
<td>Investigation of plasma turbulence in tokamak divertor and its implications for plasma-material interactions</td>
<td>Maxim Umansky, LLNL</td>
</tr>
<tr>
<td>11:30 AM</td>
<td>Effects of neutral transport on plasma scrape-off layer turbulence in gyrokinetic simulations</td>
<td>Tess Bernard, GA</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Lunch</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td><strong>Day 3 - SESSION 2</strong></td>
<td></td>
</tr>
<tr>
<td>2:00 PM</td>
<td>Modeling RF-induced ponderomotive effects on edge/SOL transport</td>
<td>Tom Jenkins, Tech-X</td>
</tr>
<tr>
<td>2:30 PM</td>
<td>Simulation of plasma transport in linear plasma device MPS-LD by using BOUT++</td>
<td>Yue Wang, DLUT (Remote, China)</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Development of the turbulence-transport coupling simulation framework for the edge plasma</td>
<td>TianYuan Liu, USTC (Remote, China)</td>
</tr>
<tr>
<td>3:30 PM</td>
<td>Break</td>
<td></td>
</tr>
<tr>
<td>4:00 PM</td>
<td>Using Coupled Pedestal and Boundary Physics to Close the Integrated Tokamak Performance and Exhaust (ITEP) Gap</td>
<td>Philip Snyder, ORNL</td>
</tr>
<tr>
<td>4:30 PM</td>
<td>Discussion</td>
<td>All</td>
</tr>
<tr>
<td>5:00 PM</td>
<td><strong>Adjourn Day 3</strong></td>
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Thursday, January 12, 2023

<table>
<thead>
<tr>
<th>Time</th>
<th>Session</th>
<th>Presenters</th>
</tr>
</thead>
<tbody>
<tr>
<td>9:00 AM</td>
<td>Hypnotoad</td>
<td>John Omotani, UKAEA (Remote, UK)</td>
</tr>
<tr>
<td>9:30 AM</td>
<td>Lessons for plasma software from the climate data analytics community</td>
<td>Tom Nicholas, Columbia Univ. (Remote, USA)</td>
</tr>
<tr>
<td>10:00 AM</td>
<td>Progress toward a Python interface for DEGAS2</td>
<td>George Wilkie, PPPL (Remote, USA)</td>
</tr>
<tr>
<td>12:00 PM</td>
<td>Lunch</td>
<td>All</td>
</tr>
<tr>
<td>3:00 PM</td>
<td>Online individual group presentations with BOUT++ experts (in purple)</td>
<td>All</td>
</tr>
<tr>
<td></td>
<td>The linear simulation of the plasma response of the RMP in BOUT++ framework</td>
<td>Bin Gui, ASIPP, Ben Zhu</td>
</tr>
<tr>
<td></td>
<td>Plasma elongation effect on the parity change in electromagnetic ITG modes and the generation of intrinsic rotation in the tokamak plasmas,</td>
<td>Helen Kaang, KFE, Zeyu Li, Tiangyang Xia</td>
</tr>
<tr>
<td></td>
<td>Theory of drift Alfvén wave instability and micro-tearing mode</td>
<td>Kaixuan, Fan, PKU, Ben Dudson</td>
</tr>
<tr>
<td></td>
<td>USTC: Simulation study of the evolution of toroidally symmetric parallel current during ELM burst based on BOUT++</td>
<td>Taihao Huang, USTC, Seto Haruki</td>
</tr>
<tr>
<td></td>
<td>The simulation of ELMs suppression by ion cyclotron resonance heating in EAST using BOUT++</td>
<td>Yanlong Li, ASIPP, Nami Li, Maxim Umansky</td>
</tr>
<tr>
<td>5:00 PM</td>
<td>Adjourn Final Day</td>
<td>All</td>
</tr>
</tbody>
</table>