



Proposal and Attendance Form for NSTX Research Forum 2001

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Please write in the boxes below a one-page abstract of your proposal to be presented:

Title: Classical vs. Neoclassical Tearing Modes

Abstract:

Common wisdom says that a positive β is destabilizing, while tearing modes can also occur when $\beta < 0$ due to the bootstrap current drive in the modified Rutherford island evolution equation. Indeed a negative β is often necessary in order to explain the soft beta limit observed in many discharges that are associated with the onset of neoclassical modes. Disruptions, on the other hand, are typically observed with low m/low n modes, and are conjectured to have either a weakly negative or positive β (classical tearing modes). In a large body of recent studies, no accurate estimate of β was at hand so that this index had to be either inferred or obtained using a crude, large aspect-ratio, zero-beta approximation. Such an approximation, often justified for large poloidal modes > 3 due to the localization of the instability about the rational surface, becomes less so in high beta, tight aspect ratio tokamaks. In NSTX, an accurate computation of β is essential.

The code PEST3 is unique in computing β in full toroidal geometry. The code has recently been extended to load equilibria from MDSPlus TRANSP data using the I2MEX/NTCC module. The aim of this proposal is to apply PEST3 to compute β in time evolving NSTX plasmas, and compare the simulations with experiments. Of particular interest will be the β values at the onset of the instability and shortly before a disruption. This will allow us to discriminate between classical and neoclassical tearing modes. In addition to β , other parameters entering the modified Rutherford equation and playing a role in the saturation process of the neoclassical/classical tearing mode will also be tracked.

<p>Choose only one topical session by inserting X for each proposal (Use separate forms for separate proposals)</p>	<p>2000 Results (mbell@pppl.gov) & 2001 Research Program (esynakowski@pppl.gov) (Please submit by January 10, 2001)</p> <p style="padding-left: 20px;"> <input checked="" type="checkbox"/> ET1: Macroscopic Stability <input type="checkbox"/> ET2: Transport & Turbulence <input type="checkbox"/> ET3: High Harmonic Fast Wave & Electron Bernstein Wave <input type="checkbox"/> ET4: Coaxial Helicity Injection <input type="checkbox"/> ET5: Boundary Physics </p> <p>2002-2005 Research Opportunities (mpeng@pppl.gov) (Please submit by January 11, 2001)</p> <p style="padding-left: 20px;"><input type="checkbox"/> TG1: Noninductive Startup</p>
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	<ul style="list-style-type: none"><input type="checkbox"/> TG2: Heating, Current Drive & Fueling<input type="checkbox"/> TG3: Macroscopic Stability<input type="checkbox"/> TG4: Transport & Turbulence<input type="checkbox"/> TG5: Energetic Particle Physics<input type="checkbox"/> TG6: Multiphase Interface (Boundary Physics)<u>Fluctuations Measurement</u> (esynakowski@pppl.gov)(Please submit by January 10, 2001)<input type="checkbox"/> Fluctuations Measurement proposals
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Select a presentation option by inserting X:

- Oral presentation in person
- Remote presentation via ShowStation and speakerphone
- Ask discussion leader to include in discussion
- No need to present, but include in meeting summaries
- Attend Forum only (in person or with remote access)

Special Requests for your proposal (projector type, time constraints, etc.):

visualization wall presentation preferred.

Please return this document via e-mail attachment to jrobinson@pppl.gov, jsavino@pppl.gov, and the corresponding organizer listed above. Please e-mail questions or comments to the organizers listed above.