Issues, status, and plans for the ECC

A summary presented to the Theory Coordinating Committee

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LLNL

Nov. 15, 2004
APS-DPP
Savannah, GA
The edge coordinating committee was initiated by OFES to help focus edge-plasma work

- Formation and initial meeting presented by Arnold Kritz
- Subsequent progress and issues presented by Tom Rognlien
Edge Coordinating Committee (ECC) is an community group to help plan and enable edge-plasma research

- Formed in July, 2004 by OFES

- Member terms normally two years; bylaws and election details at http://www.mfescience.org/ecc

- ECC will
  - provide technical assessment of edge research capabilities, needs, and priorities
  - provide a focused forum for edge research and collaborations, thereby further strengthening the existing edge community
  - promote edge research

- ECC will not
  - manage edge research nor submit proposals
The ECC mission statement summarizes its purpose

Advance US fusion science through technical assessment, prioritization, and coordination of edge plasma theory and modeling in close partnership with national experimental groups and international fusion programs.
ECC has 15 initial members with bylaws and officers determined by the members

- Glenn Bateman, Lehigh University
- Curt Bolton, Office of Fusion Energy Science, ex officio member
- Choong-Seock Chang, New York University
- Max Fenstermacher, Lawrence Livermore National Lab
- Parvez Guzdar, University of Maryland
- Taik Soo Hahm, Princeton Plasma Physics Lab
- Sergei Krasheninnikov, University of California, San Diego
- Arnold Kritz (Vice Chair), Lehigh University
- Thomas Rognlien (Chair), Lawrence Livermore National Lab
- Dalton Schnack, Science Applications International Corp
- David Schultz, Oak Ridge National Lab
- Philip Snyder, General Atomics
- Daren Stotler, Princeton Plasma Physics Lab
- James Terry, Massachusetts Institute of Technology
- Michael Ulrickson, Sandia National Lab
ECC has identified 11 topical areas whose status and needs are now being assessed

1. Elm Growth and Crash (Phil Snyder)
2. Pedestal Profile Reconstruction (Choong-Seock Chang)
3. L-H Mode Transition (Parvez Guzdar)
4. Scrape-off Layer Dynamics and Density Limit (Sergei Krasheninnikov)
5. Plasma/Material Interactions (Mike Ulrickson)
6. Atomic/Molecular Data (Dave Schultz)
7. Fundamental Equations for the Edge (Taik Soo Hahm)
8. Integrated Edge Simulations (Glenn Bateman)
9. Computational Techniques (Dalton Schnack)
10. Validation and Verification of Codes (Daren Stotler)
11. Partnerships with Experimentalists and International Programs (Jim Terry)
A four-month perspective on issues, status, and plans

**Issues:**

1. Is ECC duplicating other activities - ITPA, TTF, …?

2. Is ECC too broad - pedestal, SOL, materials, atomic physics, …?

3. How can ECC significantly engage the experimental community?

4. Is ECC sufficiently acknowledging past work?
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**Status:**

A five-year road map for edge plasma research

**Plans:**

Coordinating technical meetings

Engaging international theory/modeling efforts
Status of initially developing a 5-year roadmap

- **We are developing summaries for the 11 topic areas (see web site)**
  - July meeting: topics initiated by area coordinators
  - September meeting: community input at San Diego
  - November meeting: community input at Savannah

- **A report is being written**
  - draft will be circulated for comments in December
  - submit to OFES in late January
The topic areas are mapped to a 2D matrix that links physics problems with model development.

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<tr>
<th>Means</th>
<th>Theory</th>
<th>Technology</th>
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<tr>
<td>Fundamental processes &amp; equations</td>
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<td>Gyrokinetic with $E_T$ determination</td>
<td>Strong turb. - H and impurity blobs; kinetics</td>
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<td>Simulations &amp; reduced solutions</td>
<td>MHD, 2-fluid, &amp; 5-6D kin.; ELMs &amp; L-H</td>
<td>3D MHD, two-fluid, &amp; 5-6D kinetic codes</td>
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<td>Impurity rates</td>
<td>Impurity rates with multi-step</td>
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Some 5-year objectives

- **ELMs**
  - Nonlinear saturation and transport
  - Coupling range of spatial scales - ballooning/peeling with drift modes

- **Kinetic description**
  - Basic gyrokinetic equations
  - Implementation including turbulence

- **SOL/wall transport**
  - Impurity blob transport
  - Carbon molecular chemistry

- **Enhance partnerships**
  - Verification/comparison of codes
  - Experimental validation utilizing integration
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Status:
A five-year road map for edge plasma research

Plans:

- Coordinating technical meetings
- Engaging international theory/modeling efforts
20+ people in the edge community responded to a “future meeting” questionnaire in June ‘04

(Krasheninnikov, Rognlien June ‘04 survey)
Paraphrasing some of the individual comments

1) Interest in combining theorists, simulators, and experimentalists was strong, giving TTF a high ranking

2) Interacting with broader community, i.e., core physicists, is important (favoring TTF)

3) Strong sentiment not to add another meeting unless clearly essential – there are too many meetings already

4) Modify relevant existing meeting(s): e.g., TTF, H-mode workshop, PET, PSI, PFC, Sherwood, APS, ITPA

5) New and existing meetings should be driven by physics issues
Our first technical meeting will coordinate with TTF

• **We will join with Groebner’s Pedestal/Edge sessions**
  – The meeting will be held in Napa, CA, April 6-8, 2005
  – We envision a two-day focus (Thursday and Friday)
  – We have been encouraged to present a summary to TTF on Saturday
  – Future TTF meetings depend on assessment

• **We are working to expand our international collaboration**
  – Meeting at IAEA discussed forming an international modeling “working group” (my term)
  – We are working to develop collaborative modeling activities through the ITPA groups (divertor and pedestal groups and maybe others)
Summary

• We are moving forward, but need your comments and suggestions