ARIES Town Meeting

"Edge Plasma Physics and Plasma Material Interactions in the Fusion Power Plant Regime"

Conclusions and Future Plans

Mark Tillack (UC San Diego)

Alan Turnbull (General Atomics)

Chuck Kessel (PPPL)

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UC San Diego

Anticipated outcomes from this meeting

- Better understanding of the interconnected science and technology issues of the plasma edge and plasma-facing materials and components.
- New channels of communication within the community.
- Definition of the R&D gaps (including modeling needs) from present-day devices to power plants.
- Documentation.
- Follow-on meetings?

Documentation

- An archival record of the meeting
- We could use the agenda as a 1st outline
- Speakers as co-authors
- Schedule

Outline

1. ***Background and power plant requirements***

M. Tillack (UCSD)	Introduction, Issues and R&D Needs
S. Lisgo (ITER)	Description of ITER's edge regime
F. Najmabadi (UCSD)	Edge plasma and PMI concerns for fusion power plants
L. Snead (ORNL)	PMI materials behavior & constraints in a reactor environment
R. Nygren (SNLA)	HHFC designs & constraints in a reactor environment

2. ***Physics of the edge - current understanding & projections to ITER and power plants***

Rajesh Maingi (ORNL)	Heat flux measurements and modeling from C-Mod… and implications for power producing devices.
Zeke Unterberg (ORNL)	Fuel retention studies in present-day tokamaks and its relevance to a future fusion power plant
Andrea Garofalo (GA)	QH-mode and ELM-free regimes
John Wesley (GA)	Disruptions and off-normal events

3. ***Modeling of the tokamak edge***

Tom Rognlien (LLNL)	UEDGE, edge turbulence, and kinetic effects
D. P. Coster (MPI, Garching)	SOLPS and PMI modeling
Daren Stotler (PPPL)	Neutral transport from wall to scrape-off layer
Nobuyuki Asakura (JAEA)	Power exhaust simulation for the SlimCS divertor with the SONIC code

Outline, continued

4. ***Experimental benchmarking of models for power plants***

   C. Kessel (PPPL), Chris Holland (UCSD), Rajesh Maingi (PPPL), others

5. ***Innovative ideas***

M. Kotschenreuther (U. Texas)	The Super X-Divertor for high power density tokamaks
D. Ryutov (LLNL)	Snowflake divertors for power plants
Richard Majeski (PPPL)	Liquid metal PFC's for power plants
Peter Stangeby (U.Toronto)	Carbon as a flow-through consumable PFC material
Christian Linsmeier (IPP MPG)	Self-passivating tungsten alloys for FW application

6. ***New device contributions to edge physics benchmarking***

   A. Turnbull (GA), Jon Menard (PPPL), Ron Stambaugh (GA), Martin Peng (ORNL)

7. ***Conclusions***

   Tillack/Kessel/Turnbull

For each section,

Please try to address the questions specific to a power plant:

- What are the important differences between ITER and power plant regimes?
- Will the existing (or planned) R&D address power plant relevant regimes?
- If not, then what additional R&D is needed?

Thanks to all for participating!