Plasma Surface Interactions 2

Predicting the Performance and Impact of Dynamic PFC Surfaces

Project Summary

The objective of this project is to develop, and integrate, high-performance simulation tools capable of predicting plasma facing component (PFC) operating lifetime and the impact of the evolving surface morphology and composition of tungsten-based PFCs on plasma contamination, including the dynamic recycling of fuel species and tritium retention, in future magnetic fusion devices. This project will enable discovery of phenomena controlling critical PFC performance issues, and quantitatively predict their impact on both steady-state and transient plasma conditions. The outcome of this project will be a suite of coupled plasma and materials modeling tools, and a leadership class PFC simulator to predict PFC evolution and feedback to the boundary plasma. Success in the proposed research tasks will enable the prediction of both plasma fueling and the sources of impurity contamination that impact core plasma performance, and will lay the foundation for understanding, designing and developing the materials required to meet the performance objectives of future fusion reactors.

This project builds upon our SciDAC-3 project: Plasma Surface Interactions: Bridging from the Surface to the Micron Frontier through Leadership Computing

Publications and Presentations

Team

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**Sponsor**

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**Key Partners**

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<td>Simulation of Fission Gas in Uranium Oxide Nuclear Fuel</td>
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**New to the project?**

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