

FACETS: Framework Application for Core-Edge Transport Simulations

Presented by

John W. Cobb, Ph.D.

Computer Science and Mathematics

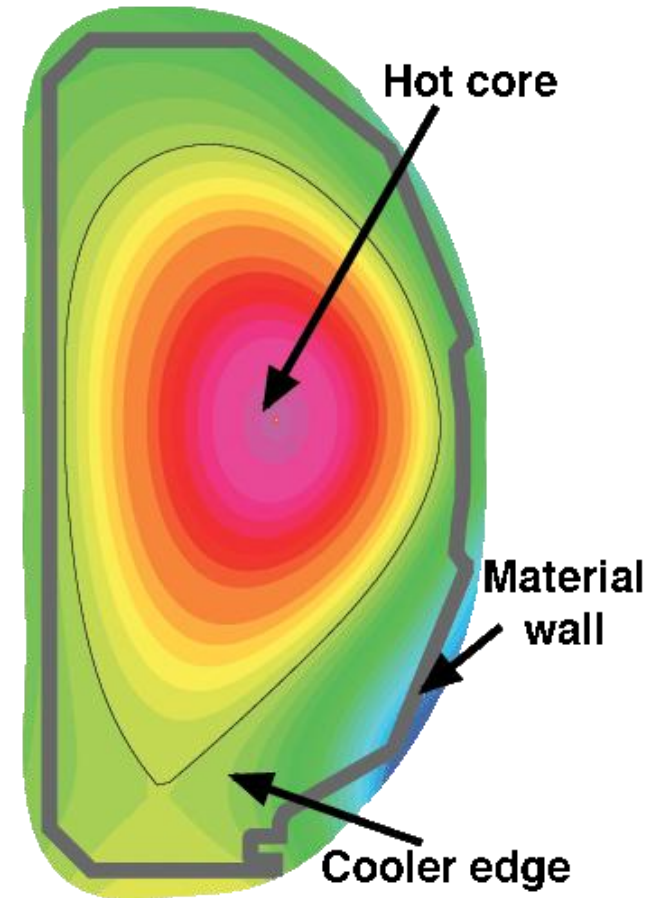
In collaboration with the FACETS team:

PI: John Cary, Tech-X Corp, and Argonne National Lab, Colorado State University, General Atomics, Lawrence Livermore National Laboratory, Paratools Inc., Princeton Plasma Physics Laboratory, University of California San Diego, Oak Ridge National Laboratory



Coupled core-edge plasma simulations

- Couple tokamak plasma interior with edge and wall
- Integrate
 - Multiple simulation codes
 - In multiple regions
 - With multiple algorithms
 - Multiple time steps
 - Multiple scales
 - Diverse physical effects



A simulation and software framework to support this multiscale physics effort

- **Defined methods for grid and region coupling (surface based for speed)**
- **Ability to couple 1-D interior models with 2-D edge and wall models**
- **Ability to couple various grid schemes**
- **Ability to substitute fast reduced models with large grand-challenge first principles simulations, and to compare the results**
- **Can accommodate implicit and explicit algorithms**
- **Test numerical stability of multi-timescale simulation**

With a nature software engineering approach

- **Advanced tool chain deployable from laptop to LCFs**
- **Nightly build integrity testing (moving toward continuous integration)**
- **Regression testing and unit testing integrated into nightly build tests**
- **Periodic performance testing (performance regression)**
- **Bilder: Advanced build configuration tool to enable detection and deployment on a wide range of platforms**

Build dashboard

Simplify multiple daily build success/error messages for a large number of test platforms

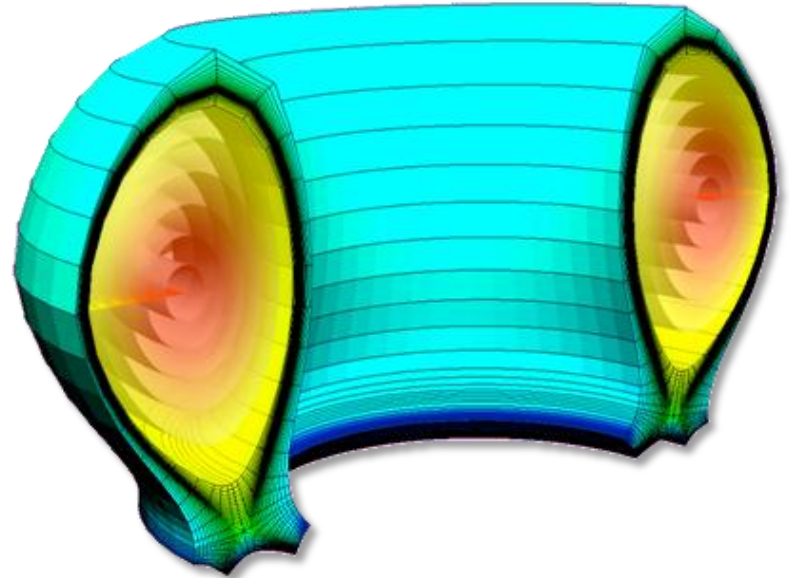
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FACETS Vizschema

- Defined visualization file format for plasma simulations
- HDF5 based
- Available viewers for matplotlib and VisIt
- SVN available at <https://ice.txcorp.com/code/vizschema/trunk>



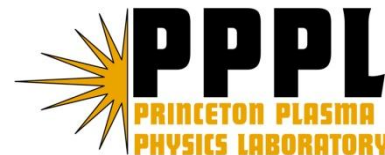
Composer: A develop environment for multiscale plasma simulations

Composer =  Setup +  Run +  Output +  Visualize +  Help

FACETS Composer is a set of interfaces (scripting and graphical) that aims to make setting up and executing components with frameworks like FACETS easier, while at the same time assist users in visualizing results from remote runs. The code is based on technologies such as Python, Qt C++ Graphical User Interface toolkit, Shell Scripts, and Secure Shell connections



FACETS collaboration team



Contact



John W. Cobb, Ph.D.

Computer Science and Mathematics

(865) 576-5439

cobbjw@ornl.gov

<https://ice.txcorp.com/trac/facets>