

## TITLE

# The ITER plasma control system simulation platform

## AUTHORS

Michael Walker<sup>1</sup>, Giuseppe Ambrosino<sup>2</sup>, Gianmaria De Tommasi<sup>2</sup>, David Humphreys<sup>1</sup>, Massimiliano Mattei<sup>2</sup>, Gregor Neu<sup>3</sup>, Chis Rapson<sup>3</sup>, Gerhard Raupp<sup>3</sup>, Wolfgang Treutterer<sup>3</sup>, Anders Welander<sup>1</sup>, and Axel Winter<sup>4</sup>

## AFFILIATIONS

<sup>1</sup>General Atomics, PO Box 85608, San Diego, California 92186-5608, USA

<sup>2</sup>CREATE/Università di Napoli Federico II, Napoli, Italy

<sup>3</sup>Max-Planck-Institut fuer Plasmaphysik, EURATOM Association, 85748 Garching, Germany

<sup>4</sup>ITER Organization, 13115 St Paul lez Durance, France

## PAPER

The Plasma Control System Simulation Platform (PCSSP) is a highly flexible, modular, time-dependent simulation environment developed primarily to support development of the ITER Plasma Control System (PCS). It has been under development since 2011 and is scheduled for first release to users in the ITER Organization (IO) and at selected additional sites in early 2015. Modules presently implemented in the PCSSP enable exploration of axisymmetric evolution and control, basic kinetic control, and tearing mode suppression. A basic capability for generation of control-relevant events is included, enabling study of exception handling in the PCS, continuous controllers, and PCS architecture. While the control design focus of PCSSP applications tends to require only a moderate level of accuracy and complexity in modules, PCSSP is also capable of embedding or connecting to more complex codes to access higher accuracy if needed. This paper describes the background and motivation for PCSSP, provides an overview of the capabilities, architecture, and features of PCSSP, and discusses details of the PCSSP vision and its intended goals and application.

Completed work, including architectural design, prototype implementation, reference documents, and IO demonstration of PCSSP, is summarized and example uses of PCSSP are provided. The high level objectives of ongoing work in 2014 are summarized and include preparation for release of a "beta" version of PCSSP for IO users and distribution to selected laboratories worldwide and preparation for the next phase of development of PCSSP. High level objectives for PCSSP work beyond 2014 are also discussed.

Work was supported by the ITER Organization under ITER/CTS/6000000037.