IAEA FEC 201

Contribution ID: **683**   Type: **Poster**

Predicted fusion performance for ITER and DEMO plasmas using a BALDUR code with predictive tritium influx model

Tuesday, 18 October 2016 14:00 (4h 45m)

The deuterium and tritium are considered as a fuel for nuclear fusion reactors in the future fusion machine, like ITER and DEMOs. Generally, deuterium is applied by gas puffing or pellet injection; whereas tritium can be internally produced from a blanket of reactors, which relies on reactions between 14.1 MeV neutrons from nuclear fusion reactions and lithium as one composite of the blankets. In this work, a model for predicting tritium flux generated from lithium blanket is developed based on the Monte Carlo code MCNP5, and implemented in the BALDUR integrated predictive modeling code to provide the information of tritium flux coming to main plasma. This suite of code is then used to carry out an evolution of plasma current, densities and temperature in ITER and DEMOs under L-mode and type I ELMy H-mode scenarios. Two designs of DEMOs considered are Chinese design and European design. In these simulations, a combination of NCLASS neoclassical transport and Multi-mode anomalous transport models (either MMM95 or MMM8_1 version) is used to compute a core transport. It is found that the wide range of fusion performance can be achieved, depending on designs and operation modes. The sensitivity of fusion performance due to the variation of plasma parameters, i.e. plasma current, toroidal magnetic field, plasma density, and auxiliary heating power, is also carried out. The ignition test for each design is also conducted. It is found that only plasmas in some of these designs can sustain the plasma and fusion reactions with slightly lower fusion performance after external heating is removed.

Paper Number

TH/P2-26

Country or International Organization

Thailand

Primary author: Dr ONJUN, thawatchai (Sirindhorn International Institute of Technology)

Co-authors: Dr WISITSORASAK, Apiwat (King Mongkut's University of Technology Thonburi); Dr CHATTHONG, Boonyarit (Department of Physics, Faculty of Science, Prince of Songkla University); Ms PROMPING, Jiraporn (Thailand Institute of Nuclear Technology); Dr SANGAROON, Siriyaporn (Mahasarakham University); Mr SOMJINDA, banjerd (Sirindhorn International Institute of Technology)

Presenter: Dr ONJUN, thawatchai (Sirindhorn International Institute of Technology)

Session Classification: Poster 2

Track Classification: THC - Magnetic Confinement Theory and Modelling: Confinement