Contribution ID: **105** Type: **Poster**

Progress in K-DEMO Heating/Current Drive and Tokamak Configuration Development

Friday, 21 October 2016 08:30 (4 hours)

A conceptual design study for a steady-state fusion demonstration reactor, K DEMO, has been undertaken by the National Fusion Research Institute (NFRI) in the Republic of Korea. Analyses of the plasma heating and current drive configuration and of the tokamak configuration have continued in support of the study. It is assumed that a combination from among at least the standard heating and current drive technologies, i.e., lower hybrid waves (LH), neutral beams (NB), electron cyclotron waves (EC), and ion cyclotron conventional fast waves (IC) will be required to satisfy the requirements for startup, efficient overall current drive, and current profile optimization. A configuration optimized for physics performance and minimum adverse impact on tritium breeding and shielding must take advantage of the available design freedom in each system, e.g., (for wave systems) in frequency, phasing, and launcher location. Parameter scan calculations for each of the four technologies have quantified the dependence of key performance metrics, such as driven current per watt and radial profile, on these design variables. Tokamak configuration studies have investigated requirements on the in-vessel systems for maintainability, access for piping services, and structural support against magnetic forces. The blanket-shield system is segmented into a small number (48) of large modules, supported in part by a segmented semi-permanent inboard shell. Structural loads due to disruption eddy currents are analyzed using a vertical-displacement event simulation in ANSYS. Methods to calculate the static forces due to the magnetic materials in the blanket structures are being developed using ANSYS. For a given segmentation scheme and assumed volume of RAFM steel in the module, it is estimated that the load on a blanket attachment is about 30% higher than eddy current loading alone.

Paper Number

FIP/P7-3

Country or International Organization

United States of America

Primary author: Dr NEILSON, George (Princeton Plasma Physics Laboratory)

Co-authors: Dr KESSEL, Charles (Princeton Plasma Physics Laboratory); Dr MIKKELSEN, David (UsPPPL); Dr ZHANG, Han (UsPPPL); Mr PARK, JongSung (National Fusion Research Institute (NFRI)); Dr IM, Kihak (National Fusion Research Institute); Mr TITUS, Peter (UsPPPL); Dr KWON, Sungjin (KrNFRI); Mr BROWN, Thomas (Princeton University, Princeton Plasma Physics Laboratory)

Presenter: Dr NEILSON, George (Princeton Plasma Physics Laboratory)

Session Classification: Poster 7

Track Classification: FIP - Fusion Engineering, Integration and Power Plant Design