FT/P1-12 · A Brief Overview of the European Fusion File (EFF) Project

M.A. Kellett, OECD Nuclear Energy Agency, Issy-les-Moulineaux, France
Contact: kellett@nea.fr

Abstract: The European Fusion File (EFF) Project is a collaborative project with work funded by the European Fusion Development Agreement (EFDA). The emphasis is on the pooling of resources and removal of duplication of effort, leading to the efficient development of two types of nuclear data libraries for use in fusion reactor design and operation work. The two branches consist of, on the one hand, a transport file for modelling and design capabilities and, secondly, an activation file for the calculation and simulation of dose rates and energy release during operation of a future reactor. The OECD Nuclear Energy Agency's Data Bank acts as the central repository for the files and all information discussed during twice yearly meetings, which it holds, offering its services at no charge to the Project.

FT/P1-13 · A Tokamak with Nearly Uniform Coil Stress Based on Virial Theorem

H. Tsutsui, Tokyo Institute of Technology, Tokyo, Japan
Contact: htsutsui@nr.titech.ac.jp

Abstract: A novel tokamak concept with a new type of toroidal field (TF) coils and a central solenoid (CS) whose stress is much reduced to a theoretical limit determined by the virial theorem has been devised. Recently, we had developed a tokamak with force-balanced coils (FBCs) which are multi-pole helical hybrid coils combining TF coils and a CS coil. The combination reduces the net electromagnetic force in the direction of major radius. In this work, we have extended the FBC concept using the virial theorem. High-field coils should accordingly have same averaged principal stresses in all directions, whereas conventional FBC reduces stress in the toroidal direction only. Using a shell model, we have obtained the poloidal rotation number of helical coils which satisfy the uniform stress condition, and named the coil as virial-limited coil (VLC). VLC with circular cross section of aspect ratio A=2 reduces maximum stress to 60% compared with that of TF coils. In order to prove the advantage of VLC concept, we have designed a small VLC tokamak Todoroki-II. The plasma discharge in Todoroki-II will be presented.

FT/P1-14 · Performance of a Compact Four-Strap Fast Wave Antenna

S.J. Wukitch, MIT Plasma Science and Fusion Center, Cambridge, USA
Contact: wukitch@psfc.mit.edu

Abstract: Ion cyclotron range of frequency (ICRF) is expected to be a primary auxiliary heating source in future experiments and fusion reactors. Compact antennas with high power density able to withstand large disruption forces present significant challenges to ICRF antenna design. A compact four-strap antenna has been installed in Alcator C-Mod and its performance has been compared with a pair of two-strap antennas. The key design features are the long vacuum strip line feeds, folded current strap configuration, use of ceramic insulators in the Faraday screen, and open Faraday screen. The heating efficiency and impurity generation are nearly identical to the other antennas while the loading is $\sim$ 2.5 higher. The power handling of the antenna was limited by arcing at relatively low maximum voltage. The strip line and antenna strap had arc damage localized to regions where the RF E-field was parallel to the tokamak B-field. For E||B, the breakdown voltage was determined to be $\sim$15 kV/cm. Redesign of the strip line has resulted in an increase in the maximum voltage from 17 kV to 25 kV. Finally, the current strap is being modified to increase the maximum voltage to $\sim$35 kV.