



IAEA FEC 2016

Contribution ID: 781

Type: Poster

Nuclear Design Analyses of SST-2

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

SST-2 will be a medium size Indian fusion reactor to be built for realizing the reactor technologies and D-T fuel cycle. It has a low fusion gain ($Q = 5$) and fusion power output can be from 100 to 300 MW. This work presents nuclear design analyses for SST-2 employing the Indian LLCB (Lead Lithium Ceramic Breeder) blanket for the tritium breeding. The nuclear design analyses address the tritium breeding capability, the shielding performance and the nuclear power production taking into account various engineering design parameters. 1-d radiation transport calculations have been performed to predict the neutronics performance of the SST-2 reactor with breeding blanket at only outboard side. A Tritium Breeding Ratio (TBR) of 0.9 was obtained and the shield thickness (shield blanket + Vacuum Vessel) of ~80 cm at the inboard mid plane was sufficient for keeping the radiation loads on TF coil under the limits. In order to achieve tritium self-sufficiency and to design a shield sufficient for 5 Full Power Year operations, a modified radial build with breeding blanket at inboard & outboard side is being analyzed. The breeding and shielding performance is being investigated at the inboard torus mid-plane regarding the radiation load to the super-conducting toroidal field coil. Nuclear responses such as TBR, fast neutron fluence, dpa and nuclear heating at TF coil will be calculated to obtain required breeding blanket and shielding thickness. Main results of the study with the new radial build will be presented in this paper.

Paper Number

FIP/P7-25

Country or International Organization

India

Primary author: Mr DANANI, Chandan (Institute for Plasma Research, Bhat, Gandhinagar, Gujarat, India-382428)

Co-authors: Mr SHARMA, Aashoo (Institute for Plasma Research); Mr CHAKRABORTY, Arun (Institute for Plasma Research, Bhat, Gandhinagar, Gujarat, India-382428); Mr SAIKIA, Bipul Jyoti (Centre of Plasma Physics – Institute for Plasma Research, Nazirakhat, Tepesia, Sonapur, Kamrup (M), Assam-782 402); Mrs SHARMA, Deepti (Institute for Plasma Research, Bhat, Gandhinagar, Gujarat, India-382428); Mrs M, Himabindu (Institute for Plasma Research, Bhat, Gandhinagar, Gujarat, India-382428); Mrs AGRAWAL, Jyoti (Institute for Plasma Research, Bhat, Gandhinagar, Gujarat, India-382428); Ms CHANDRASEKHAR, Kanya (Institute for Plasma Research, Bhat, Gandhinagar, Gujarat, India-382428); Mr GOTEWAL, Krishan Kumar (Institute for Plasma Research, Bhat, Gandhinagar, Gujarat, India-382428); Mr MANOAHSTEPHEN MANUELRAJ, ManoahStephen Manuelraj (Institute for Plasma Research, Gandhinagar, Gujarat-382428, INDIA); Mr RASTOGI, Naveen (Institute for Plasma Research, Gandhinagar, Gujarat-382428, INDIA); Mr KAW, P K (Institute for Plasma Research, Bhat, Gandhinagar, Gujarat, India-382428); Mr DUTTA, Pramit (Institute for Plasma Research, Bhat, Gandhinagar, Gujarat, India-382428); Mr

ELLAPPAN, Rajendrakumar (Institute for Plasma Research, Bhat, Gandhinagar , Gujarat, India-382428); Mr DESHPANDE, S P (Institute for Plasma Research, Bhat, Gandhinagar , Gujarat, India-382428); Dr KHIRWADKAR, Samir (Institute for Plasma Research, Bhat, Gandhinagar , Gujarat, India-382428); Mr DUTTA, Someswar (Institute for Plasma Research, Bhat, Gandhinagar , Gujarat, India-382428); Dr PRADHAN, Subrata (Institute for Plasma Research, Bhat, Gandhinagar 382428, Gujarat, India); Mr PRASAD, Upendra (Institute for Plasma Research, Bhat, Gandhinagar , Gujarat, India-382428); Mr MENON, Vinay (Institute for Plasma Research, Bhat, Gandhinagar , Gujarat, India-382428)

Presenter: Mr DANANI, Chandan (Institute for Plasma Research, Bhat, Gandhinagar , Gujarat, India-382428)

Session Classification: Poster 7

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