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Zero D and 1 ½ D Transport Analysis of SST 2

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A key step towards a DEMO reactor and beyond is the development of key facilities addressing various engineering and physics issues. In the Indian plan, SST 2 is under consideration as a low Fusion gain (Q =5) Reactor for realizing and qualifying technologies for D-T fusion cycle and for the Indian DEMO programme [1][2]. The 0 D physics design of SST 2 is done using the 0 D systems code SPECTRE that is used for the physics design of SST-2 [3]. The 100 MW baseline operation of SST 2 is a conservative design and assumes an ELMy H mode operation. To supplement the 0 D code, a 1½ D transport code simulation is done using METIS for the baseline parameters –R0 4.42 m, a –1.47 m, and BT –5.42m, Ip = 11.2 MA. Various current drive schemes are simulated first for an auxiliary power of 20 MW NBI and then with a power sharing of 12MW NBI and 8 MW ICRH for assessing the steady state operational regime for SST-2. The total volt second used is checked with the available flux of the CS coils [4] to assess the pulse length of SST-2. A design sensitivity analysis using the 0 D code is then carried out to assess the physics parameter space on the baseline operation. Particularly, the effect of varying the HH factor, Aspect ratio and the Greenwald density ratio is checked for optimizing the fusion gain, pulse length and the fusion power. A performance assessment for the ignited domains and varying fusion power is done by the means of PoPCoN [5] representation. The accessible physics design space for the various operational scenarios of SST-2 are then presented.

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