

ECRF stray radiation studies in preparation of the operations of JT-60SA

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For its initial research phase, the JT-60SA tokamak will be equipped with four gyrotrons units delivering up to 3 MW at 110 GHz to the plasma. Together with 6 MW of P-NBI and 10 MW of N-NBI the ECRF power will be used to sustain and control stable operation at high current with a lower single null CFC divertor plasma configuration. The development of the current ramp-up up to full-current operation (5.5 MA) is among the first scientific objectives of this phase. In preparation of this, predictive modelling of the current ramp-up in scenario 2 (type I ELMs, H-mode scenario, $B_T=2.25$ T, $q_{95}=3$) is being done, based on parameters published in [1]. In this scenario the ECRF power is injected from an early phase of the current ramp. Such modelling provides the Te and ne profiles giving the opportunity to estimate the expected amount of EC stray radiation during the ramp-up phase when the EC power absorption might be less than 100% and consequently the potential risk of damage of the in-vessel components is higher. The study of the current ramp-up phase complements the analysis of the low absorption scenarios being considered for the design of the EC stray detection system, which is presently based on the adaptation to the JT-60SA parameters of the differential bolometers being developed for ITER. In particular, expected locations and EC stray power loads on PFCs due to shine-through of the EC beams are identified.

References

[1] V. OSTUNI et al Nucl. Fusion 61 026021 (2021)

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