Radiated power and radiation density profiles characterizing high emissivity regions during DTE3

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Abstract

During the DTE2 and DTE3 JET campaigns, efforts were made to develop a high-current baseline scenario [1]. Baseline plasmas were affected by impurities (primarily beryllium Be and tungsten W), which were localised on the low-field side of the device. Tomograms derived from bolometric measurements highlighted regions of high radiated emissivity at the periphery of the plasma. This radiation avoided the core from being poisoned by such impurities, which could otherwise lead to an abrupt termination of the discharge (disruption) or simply prevented high fusion performance from being achieved. Such sort of screening was ensured by maintaining a steady ELM regime [1]. This contribution presents an analysis of tomograms derived from bolometric measurements in order to estimate the radiated power and radiation density profiles of these highly emissive regions for a selected set of DTE3 pulses. Preliminary results show that emissivity peaks occur in these regions close to the top of the pedestal (i.e. around $\psi \sim 0.75$ with respect to $\psi \sim 0.9$), accounting for up to 78% and 71% of the radiated power from the core and total radiated power, respectively. Further efforts will be dedicated to an extended systematic analysis. This work is expected to be relevant for modelling purposes, considering the provided radiation density profiles as sinks, and could provide a feature for disruption mitigation studies.

Keywords: Fusion Plasmas, Deuterium–Tritium; Bolometer Tomography; Impurity Radiation

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[1] L. Garzotti et al., "*Development of high-current baseline scenario for high deuterium–tritium fusion performance at JET*", Plasma Phys. Control. Fusion 67 (2025) 075011 (10pp), doi