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PhD Thesis Abstract

Experimental investigation of the scrape-off layer enhanced radial transport using reflectometry diagnostics

Increasing emphasis has been put on scrape-off layer (SOL) transport studies, as it has become evident that plasma-surface interactions influence, or even dominate, the overall reactor performance. Indeed, the compatibility of the power exhaust to the walls and plasma-facing surfaces with an adequate survival time of these structures and a sufficiently low impurity concentration in the bulk plasma is presently seen as one of the most critical issues determining the viability of a fusion reactor. In the SOL, the dominant mechanism for cross-field transport is the outward propagation of intermittent convective structures known as "filaments". Although a general picture of filamentary transport is well established in L-mode, limited information is available for high density high-power H-modes regimes preferable for the future generation of reactors.

The main goal of this thesis project is to expand the SOL characterization to high-density high power H-mode regimes using mainly the new multichannel reflectometry diagnostic recently installed in the ICRF antenna that opens up research opportunities in the area of SOL physics. This will be achieved by exploring the high temporal and spatial resolution of the diagnostics and by taking advantage of the three diagnostic channels installed at different poloidal locations. The final goal of this PhD project is to contribute a better understanding of the SOL enhanced radial transport in fusion relevant regimes.