Abstract for EPS 97

Influx of metal impurities from toroidal and poloidal limiter in FTU

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Poloidal limiters made with different materials (inconel,W and Mo) and a Molibdenum toroidal limiter have been used on the Frascati Tokamak Upgrade (FTU) to define the last closed magnetic surface.

The study of the plasma contamination due to the inflow of metallic impurities, which occurs as a consequence of the plasma limiter interaction, is of importance in view of the possibility of using high Z materials in some region of the ITER divertor. Such a study can be conveniently performed on FTU since, in this device, the limiter thermal loads are comparable to that predicted for the ITER divertor.

Visible spectroscopy is an important diagnostic tool for studying the fluxes of impurities emitted by materials facing the plasma. In fact, it is generally possible to infer the flux of particles released by those surfaces by measuring the brightness of spectral lines in the visible range emitted in the cold plasma periphery where they are mostly neutral or weakly ionized.

In this paper, the impurity influxes have been evaluated and compared in different operating conditions with both limiters, either in ohmic and in RF discharge.

A typical characteristic of the metallic impurity flux is a strong inverse dependence on the electron plasma density. With the poloidal inconel limiter, this dependence for Cr and Ni has been assessed experimentally over a wide range of stationary operating conditions. Mo lines have shown the same behaviour during the density rise, while they are observed in stationary phases only at high plasma current.

Mo flux is evaluated from the MoI lines, which correspond to the transitions to the fundamental, a^7S ($<\lambda>$= 3846 A), and to the first metastable levels, a^5S ($<\lambda>$= 5529 A).

The Mo influx is inversely proportional to the Mo limiter surface, when changing from poloidal (<5.E20 part/s/m^2) to toroidal (<5.E19 part/s/m^2), i.e. the total number of Mo atoms comings from the limiters is about the same.

In the case of Mo toroidal limiter, significant contribution from other metallic impurities are usually observed even if their emitting surfaces are negligible.