Marfe in FTU

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The term marfe [1] is an .acronym for " multifaced asymmetric radiation from the edge " and defines a band, toroidally symmetric and poloidally asymmetric, of impurity radiating plasma, resulted by a radiative thermal instability [2] and characterized by high electron density and low electron temperature. The formation of the marfe occurs at the inner plasma edge, i.e. at the high magnetic field side of a Tokamak in a limiter device, as FTU. The occurence of a marfe is easly identified by different diagnostic systems. In fig. 1 the signals of D and visible bremsstrahlung emission, together with the emission measured by a channel of the bolometer system and the electron density measured by the DCN interferometer are shown. The combination of signals from horizontal and vertical arrays, measuring the emission from the plasma in the visible range, allows the localisation of the marfe position. The presence of a marfe can preclude the determination of the total emitted radiation from the plasma bulk. If the marfe is totally or partially in the view of bolometers, radiation losses are overestimated, since it introduces a poloidal asymmetry [3].

In order to derive the contribution of the marfe to the radiation losses and its specific emissivity, a subset of discharges, where marfe occurs, characterized by having the strongly radiating region in complete view of the bolometers, have been analyzed . The subset includes discharges with plasma current Ip=0.3-1.1 MA, magnetic field Bt= 6-7 T and with a critical density range between 0.9 and 1.9 10 ^20m^-3. Since electron density and temperaure profiles and Zeff do not change for a short time after the marfe onset, the radiation emission from the plasma bulk can be assumed unchanged, so that the increase in the bolometers signals is only attributed to the marfe. From the signals of the visible horizontal arrays, the poloidal exention of

the marfe region is deduced in order to reconstruct its emission area. The radial size is taken 2-4 cm inside the last closed magnetic surface.

Marfe radiation losses amount to 10-15% of the bulk radiation losses, while its emissivity ranges between 2 and 12MW/m^3. This emissivity does not show any depenence on the line average density, while a correlation has been found with the net power (Poh - Prad) transported to the plasma edge (fig.2).

REFERENCES

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FIGURE CAPTION

Fig.1-Signals indicating th onset of a marfe in FTU: a) line average density on the central channel and on the channel positioned at r=-18 cm; b) D emission along a view line crossing the plasma center: c) bremsstrahlung emission on the same line of view; d) central chord of the bolometer array.

Fig.2-Radiation emissivity in the marfe versus the conduction power, Pohm-Prad.