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P2.069 Estimation of neutral fluxes on the first mirror of H-alpha diagnostics in ITER

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The first mirrors of all optical diagnostics will be exposed to the fluxes of neutrals, mainly D, T and Be, from the plasma in ITER. This can lead to formation of erosion and deposition zones on the mirror surface. The location of the zones will depend on D,T/Be flux ratio and geometry of the cutouts in the diagnostic shield module (DSM). In H-alpha diagnostics, the first mirrors in equatorial port plugs are located behind 7 mm diameter entrance pupil (pinhole) to reduce the neutral atom fluxes to the mirror surface.
In this work, the fluxes of neutral D, T and Be on the first mirror of H-alpha diagnostics in the equatorial ports were calculated with Zemax OpticStudio. Only stationary modes of ITER were considered. The geometry of the DSM cutouts and the first mirror units (FMU) were taken from the ENOVIA database. It was shown that the most of the first mirror surface is occupied by an erosion zone with erosion rate about 50 nm/year. The deposition zone is located on the edges of the mirror with deposition rate ~100 nm/year. Being made of single crystal molybdenum, the mirrors will keep their optical properties under erosion. The contaminated edges are not important for the light collection and imaging of the SOL emission in the areas of interest at the ITER first wall within the selected field-of-view.
Resuming, the first mirrors of H-alpha diagnostics will be capable to provide acceptable optical performance in the stationary modes in ITER lifetime. The DC plasma discharge mirror cleaning system is implemented in the FMU design in order to restore the performance if the accidental events cause the FM contamination e.g. due to ELMs or water leak into the vessel.

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