

P5.1025 Effects of dust on plasma discharges during tokamaks start-up phase

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See full abstract here:

<http://ocs.ciemat.es/EPS2019ABS/pdf/P5.1025.pdf>

Dust in tokamaks is unlikely to be mobilized prior to the beginning of plasma discharges, then dust presence in the vessel during the start-up phase of discharges is not considered an issue. Problems could arise due to the presence of magnetic dust [1,2,3] that are more likely to fly in the vessel volume during start-up phase [4] and could interfere with the plasma discharge [5]. In fact the presence of dust in the early phase of discharges can induce a shift of the optimal loop-voltage vs. gas pressure curve during breakdown phase (i.e. shift in the Paschen's curve), or perturb the plasma resistivity, through the perturbation of Z_{eff} , leading to a change of the current rise time and a limitation in the plasma current plateau during start-up. In the perspective of the use of stainless steel for the ITER diagnostic first wall [6] and RAFM steel in future fusion plants [7], the presence of magnetic dust could not be negligible.

In this work we propose a model to describe the start-up phase of plasma discharges in presence of solid metallic particles (dust). Examples on how the presence of dust can interfere with the current rump-up phase for relevant dust densities and dust nature scenarios, being dust generally composed by different materials, is presented.

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