Prompt effects of partially ionised W dust in the JET shallow SOL

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Abstract Transient radiative bursts have been observed in systematic time-correlation with dust influx across the separatrix in JET ILW campaigns, [1]. Dust influx from PFC materials can produce transient temperature and density perturbations in the SOL. Are such local perturbations detectable by existing diagnostics? Could they be used as an additional monitor for safe operation? Results from the model illustrated here indicate that local densities of dust can produce bursts of acoustic waves in the low-temperature, low-density SOL, that could be detected by existing diagnostics.

1. Introduction

On time scales much shorter than those typical of transport in the tokamak edge confinement region, the inflow of macroscopic W dust from the divertor up and across the separatrix, can cause sudden, short-lived, radiative events and localised perturbations of the edge density and temperature profiles. Eventually the inflow of W dust in the peripheral tokamak plasma and the subsequent deposition of ionized W dust could have consequences on the stability and safety of the pulse, [1]. Such considerations suggest the investigation of possible destabilization of detectable electrostatic waves, [2], similar to a *pebble in the pond* effect, of the charge balance perturbation. The inflow of a population of micrometric (≃1-50μm) W dust (~1mg) released randomly by divertor tiles and nearby PFCs, is considered. The average initial speed is assumed to be larger than the adhesion limit, $v_{stick} \approx$ 10m/s. From modelling and experimental