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Investigation of Vapor Cloud Effects on Fusion Plasma-Dust Interactions for High-Z Materials BENJAMIN BROWN, SERGEI KRASHENINNIKOV, ROMAN SMIRNOV, UCSD — Recent experimental and computational studies have shown that dust grains can have a significant impact on fusion tokamak operations. Formed by intermittent heat loads to plasma facing components (PFCs) and various other edge plasma-surface interactions, massive dust grains can penetrate deeply into the plasma where further heating generates plasma impurities by ablation. In extreme cases, dust ejection from PFCs has been experimentally shown to cause termination of the plasma discharge. Currently, the models used to simulate fusion plasma-dust interactions ignore the vapor cloud around each grain and its effects such as gas dynamic shielding as well as electrostatic shielding and radiative cooling due to the formation of a partially ionized secondary plasma. Previously, by studying these effects for the low-Z materials Li, Be, and C, it was found that the current models are applicable only for sufficiently small dust grains which produce vapor clouds of negligible density. In this work, we present and compare the same limits of applicability for grains composed of the high-Z materials Fe, Mo, and W. We also discuss the appearance of a bifurcation in the maximum allowable dust grain radius for Mo and W due to thermionic electron emission at high plasma density and temperature.

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