Abstract Submitted
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An Analytical/Computational Approach to the Effect of Roughness on Erosion: Global and Local Angles[1] A. LASA, J.M. CANIK, E.A. UNTERBERG, J. RAPP, ORNL, C. CHROBAK, GA, P.C. STANGEBY, U.Toronto — Plasma-material interactions lead to erosion of plasma facing surfaces, limiting component lifetime, and leading to impurity production and plasma contamination. Surface erosion depends, among other parameters, on the impact angle, which is determined both by local plasma conditions and surface morphology. For rough surfaces ($O(\mu\text{m})$), the "local" particle impact angle can differ significantly from the "global" impact angle defined by the average surface contour. So far, studies targeted at bridging these local and global angles have been of interpretative focus, aiming to model and understand erosion of naturally occurring surfaces following their exposure to plasma. Here, a more general study of how surface morphology impacts erosion is undertaken by deriving impact angle and density distributions for analytically described surfaces, while systematically varying the "global angle" and degree of roughness. These distributions are used to derive spatially resolved erosion yields, as well as estimating the impact of roughness on the total erosion. Surfaces of interest also include ones intentionally sculpted to control material surface migration.

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