Abstract Submitted
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Fast, Statistical Model of Surface Roughness for Ion-Solid Interaction Simulations and Efficient Code Coupling[1] JON DROBNY, DAVIDE CURRELI, DAVID RUZIC, University of Illinois at Urbana-Champaign, ANE LASA, DAVID GREEN, JOHN CANIK, Oak Ridge National Lab, TIM YOUNKIN, SOPHIE BLONDEL, BRIAN WIRTH, University of Tennesee Knoxville — Surface roughness greatly impacts material erosion, and thus plays an important role in Plasma-Surface Interactions. Developing strategies for efficiently introducing rough surfaces into ion-solid interaction codes will be an important step towards whole-device modeling of plasma devices and future fusion reactors such as ITER. Fractal TRIDYN (F-TRIDYN) is an upgraded version of the Monte Carlo, BCA program TRIDYN developed for this purpose that includes an explicit fractal model of surface roughness and extended input and output options for file-based code coupling. Code coupling with both plasma and material codes has been achieved and allows for multi-scale, whole-device modeling of plasma experiments. These code coupling results will be presented. F-TRIDYN has been further upgraded with an alternative, statistical model of surface roughness. The statistical model is significantly faster than and compares favorably to the fractal model. Additionally, the statistical model compares well to alternative computational surface roughness models and experiments. Theoretical links between the fractal and statistical models are made, and further connections to experimental measurements of surface roughness are explored.

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