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Verification and UQ activities of the Particle-In-Cell code hPIC for Near Surface Plasma Conditions MOHAMMAD MUSTAFA, DAVIDE CURRELI, university of illinois at urbana-champaign, PABLO SELESON, CORY HAUCK, DAVID BERNHOLDT, oak ridge national laboratory — A crucial step of the verification of Particle-in-Cell codes is systematic estimation of error produced by simulation models. Here we report a series of verification tests of the Particle-in-Cell code hPIC for plasma sheath and plasma boundary problems under various conditions. Furthermore a preliminary Uncertainty Quantification has been performed on the code. The dependency of physical parameters such as the IEAD (Ion Energy-Angle Distribution) of the ions crossing a plasma sheath have been investigated. However, due to the limited number of the empirical or semi-empirical formulas available in the literature that can describe the floating wall potential at high values of magnetic field or IEAD, the method of manufactured solution has been preliminarily investigated. The approach of bootstrap sampling has been used in uncertainty quantification to ensure covering a wide range of numerical and physical variable and keeping the computational intensity as low as possible. Both random number and pseudo-random number generators have been used to study the effect of particle noise of propagated uncertainties. Overall, a robust convergence has been found, and the numerical bound has been determined.

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