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Sheath dynamics in a fusion plasma with oblique magnetic fields X.Z. TANG, N.S. KRASHENINNIKOVA, Z.H. GUO, LANL — To understand the plasma/surface interaction, one must know how plasma sheath modifies the characteristics of the upstream plasma as it approaches the wall surface. This is not only important to decipher the wall response to the ion bombardment flux, but also necessary for quantifying inward impurity transport and assessing the fate of dust particulates anticipated in a tokamak reactor. The magnetic field typically intercepts the tokamak wall at an oblique angle. Here we present a systematic, kinetic simulation study on how the inclination angle of the magnetic field affects the sheath plasma and its dynamics in both the high-recycling (collisional) and low-recycling (nearly collisionless) regimes. Specifically we will show its effect on wall potential and plasma potential in the sheath and presheath, the characteristics of the normal-to-the-wall and parallel-to-the-B-field particle and energy flux in the sheath/presheath region. The new findings provide an interesting comparison with the standard Chodura model. The implication on dust motion and survivability in a tokamak reactor will be explained, along with the implied constraint on divertor designs.

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