Abstract: Comprehensive investigation of plasma sheath formation and consequent dust levitation on lunar surface is important for interpretation of results of future lunar missions (such as LADEE and ARTEMIS). Until recently, most of such studies were done in experimental laboratories at reduced scales. Due to the complexity and nonlinearity of the problem, only simplified theories, describing this effect, were developed. However, recent progress in high-performance kinetic plasma simulations allowed tackling the problem of plasma sheath formation numerically. In this poster we will present the simulation results of plasma sheath formation above the lunar craters in presence of solar wind and photoelectron emission. These results were obtained using 3D Particle-In-Cell (PIC) code VORPAL. In the simulations we considered plasma sheath formation for normal, 45 and 90 degree incidence solar wind. Sample distribution of electric field in plasma sheath is shown in Figure 1. The poster will also cover the influence of magnetic field on the sheath formation. In the second part of the poster, we will present results of simulations of the LASP (Laboratory for Atmospheric and Space Physics at University of Colorado) experiments on study of plasma sheath formation above hemispherical isolated dimple. Finally, we will present results of the influence of external magnetic field on plasma the sheath formation.