

Simulations of dusty surfaces charged by plasma currents and photoemission.

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Dusty surfaces in space can be found on moons, asteroids or comets. Such surfaces are subject to charging by plasma currents. When exposed to the solar radiation, photoemission also needs to be included in the analysis. Differential charging of dust and surface can have impacts on the dust dynamics and transport over such a surface. This study presents results from numerical simulations of self-consistent charging of insulating dust grains on a surface in plasma and exposed to a directional photon flux. Both the charge on individual dust grains and plasma density distribution in the vicinity of the surface are examined. It is shown that photoemission can lead to a complex potential on a dusty surface, and to substantial electric fields between the grains, which will impact the dust dynamics. Simulations are carried out with the three dimensional particle-in-cell code DiP3D.