Dynamics of multi-sized dust grains on the electrostatic sheaths in presence of magnetic field

S. Chekour¹, A. Tahraoui¹, B. Zaham²

1 Quantum Electronics Laboratory, Faculty of Physics, U.S.T.H.B.
BP 32 El-Alia Bab Ezzouar, Algiers 16111, Algeria

2 Département des Sciences Appliquées, Université de Bouira
Rue Drissi Yahia, Bouira 10000, Algeria

In this work, we have studied the effect of multi-sized dust grains on the electrostatic sheaths in presence of magnetic field. Therefore, we have investigated the dynamics of the dust grains. For this, we have established a three dimensional, collision, stationary and magnetized plasma sheath model. The electrons are considered in thermodynamic equilibrium; however the ions and the dust grains are described by fluid equations, where the dust sizes are modelled by Gaussian law¹. To describe the dust charge, we have used the orbit motion limited model (OML). The numerical results show that the dust size distribution changes considerably the behavior of the electrostatic sheath; especially, the sheath thickness is reduced compared to the mono-sized case. Moreover, the presence of magnetic field increases the oscillatory structure of the electrostatic potential. The trapping of the dust grains is also discussed by considering all forces acting on them and the corresponding potential energy. The physical parameters controlling these effects are also analyzed and discussed.