On the wake structure in a flowing magnetized plasma

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Dynamical screening and wake effects in complex plasmas have been the subject of many early investigations, including experimental [1] as well as theoretical work [2]. However, it was shown in experiments [3] and using Linear Response (LR) theory [4] that the characteristic features of the wake potential are qualitatively different in the presence of a magnetic field. Here, the electrostatic potential of a dust grain in a flowing magnetized plasma is computed using the 3D parallel PIC Code ‘COPTIC’ [5]. In addition to the magnetic field, the system takes into account the effect of ion-neutral collisions. We compare our numerical results with the wake potential obtained from the LR formalism for magnetized as well as unmagnetized [6] cases. We discuss the physics of distribution function, flux etc. around the grain and present a parametric study of magnetization vs. wake peak position, peak potential etc. for the magnetized streaming plasmas.

References