

SCREENING OF ABSORBING GRAINS IN PLASMA WITH A FLOW

Yu. O. Tyshetskiy, S. V. Vladimirov

School of Physics, University of Sydney
(*Sydney, NSW 2006, Australia;*
e-mail: y.tyshetskiy@physics.usyd.edu.au)

S u m m a r y

The electrostatic shielding of a charged absorbing object (dust grain) in a flowing collisionless plasma is investigated by using the linearized kinetic equation for plasma ions with a point-sink term accounting for the ion absorption on the object. The effect of absorption on the attractive part of the dust grain potential distribution in plasma is investigated. For subthermal ion flows, the attractive part of the grain potential in the direction perpendicular to the ion flow can be significantly reduced or completely destroyed, depending on the absorption rate (proportional to the surface area of a grain). For superthermal ion flows, however, the effect of absorption on the grain attraction in the direction perpendicular to the ion flow is shown to be exponentially weak. It is thus argued that, in the limit of superthermal ion flow, the effect of absorption on the grain potential distribution in plasma can be safely ignored for typical grain sizes relevant to complex plasmas.