Distribution of electric potential around a small absorbing body in plasmas: Effect of ion-neutral collisions.

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Effect of ion-neutral collisions on the electric potential distribution around a small absorbing body immersed in a weakly ionized plasma has been investigated using a simple kinetic model. It is shown that collisions enhance the amplitude of the potential far from the grain even in the weakly collisional regime, when the ion mean free path is considerably larger than the Debye radius. The asymptotic behavior of the potential changes from $\sim r^{-2}$ to $\sim r^{-1}$ dependence on distance. This finding can significantly improve the understanding of such questions in complex (dusty) plasmas as interparticle interactions, dust crystal formation and melting, occurrence of liquid-vapor critical point, etc. It can be also useful in the context of probe theory.