

Multi-fluid MHD Model of charged dust interaction with plasma around Enceladus

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Abstract

The corotating saturnian magnetosphere overtakes Enceladus at 26.4 km/s, generating plasma and field perturbations downstream along its orbit. The Cassini observations at Enceladus have largely improved our understanding of this small icy world. Yet more problems emerged as we acquire more details. Among these, answering how charged dust affects the plasma-Enceladus plume interaction is believed to help solve the puzzles in large scale magnetic field perturbations, as well as flow signatures. In the past we have constructed a MHD model to determine the plume variability constrained by the magnetometer observations. In this study we upgrade our previous single-fluid model into a multi-fluid MHD model by incorporating the charged dust as a fluid component to investigate the dust-Enceladus plume interactions.