Interpreting Dust Impact Signals Detected by STEREO

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Abstract

Dust impacts on spacecrafts have been recorded by electric field antennas for decades (Gurnett et al., 1983, 1984, 1991; Aubier, 1983; Meyer-Vernet et al., 1986, Pedersen et al., 1991); however, a good theoretical model for how these signals are generated has yet to be proposed. A recent model proposed in 2015 can generate many of the signals recorded by the STEREO spacecraft [Zaslavsky, 2015]. We investigate the order of magnitude of the charge collection by the spacecraft and antennas after the dust impact using SIMION® simulations. We then analyze the proposed model given the simulation results and a survey of the 2008 STEREO A data. We find that the model does not describe how the simultaneous signals measured by different antennas are generated. Furthermore, we find that the collection of charge by the antennas is less than expected and therefore may not be enough to generate important signal characteristics.