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Measurement of short (Debye length) scale electrostatic waves with MMS EDP instrument: Problems and possible mitigation

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High frequency electrostatic oscillations are one of the most fundamental players in energy conversion in collisionless plasmas. Whether at collisionless shocks, turbulence energy cascades or reconnection, small scale Debye length processes are at the heart of irreversible energy exchange between particles and fields. MMS is one of the most advanced still active spacecraft, with high resolution field and particle instruments. The electric field instrument (EDP) on board of MMS is formed of 3 axial double probes positioned in a perpendicular configuration allowing for the measurement of the 3D electric field. In this study we probe the limitations of the EDP instrument in measuring Debye-scale electrostatic oscillations. In particular we show that at such small wavelengths the electric field is attenuated due to the finite probe-to-probe separation. Furthermore, we propose a method to correct for the electric field attenuation based on the single spacecraft interferometry technique which will allow us to properly determine the observed wave modes.