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Testing THEMIS wave measurements against the cold plasma theory

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The THEMIS (Time History of Events and Macroscale Interactions during Substorms) mission records a multitude of electromagnetic waves inside Earth's magnetosphere and provides data in the form of high-resolution electric and magnetic waveforms. We use multi-component measurements of whistler mode waves and test them against the theory of wave propagation in a cold plasma. The measured ratio cB/E (c is speed of light in vacuum, B is magnetic wave amplitude, E is electric wave amplitude) is compared to the same quantity calculated from cold plasma theory over linearized Faraday's law. The aim of this study is to get estimates for measurement uncertainties, especially with regard to the electric field and the cold plasma density, as well as evaluating the validity of cold plasma theory inside Earth's radiation belts.