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Wave Propagation Properties Using the Van Allen Probes EMFISIS Waveform Receivers

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The twin Van Allen Probes spacecraft were launched on August 30, 2012 to study Earth's Van Allen radiation belts. The Electric and Magnetic Field Instrument Suite and Integrated Science (EMFISIS) investigation includes a plasma wave instrument (Waves) that simultaneously measures three orthogonal components of the wave magnetic field and the three orthogonal components of the wave electric field from $\sim$10 Hz to 12 kHz. Measuring all six components simultaneously allows the wave propagation parameters of the plasma wave emissions to be obtained. The Waves instrument is able to determine these parameters with both onboard and ground processing at very high time and frequency resolutions. Since launch, a variety of plasma waves have been detected that are believed to play a role in the dynamics of the radiation belts, including whistler-mode chorus, plasmaspheric hiss, and magnetosonic equatorial noise. The wave propagation characteristics, including the Poynting flux, wave normal vector, and polarization, of these emissions will be presented and discussed.