Identification of Field Line Resonances in the Magnetosphere Using the Super Dual Auroral Radar Network (superdarn): New "CROSS-POWER and Cross-Phase Technique

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Field Line Resonances (FLRs) are Ultra Low Frequency (ULF) standing waves that appear in discrete frequencies and occur in Earth’s Magnetic Field as a result of wave coupling of MHD compressional and Shear Alfvén waves. The main purpose of the new ‘cross-power and cross-phase’ technique, presented in this analysis, is to systematically identify FLR occurrence using data from the Super Dual Auroral Radar Network (SuperDARN), a radar network that detects coherent echoes from plasma irregularities that are aligned with the field lines. SuperDARN data has been successfully used for more than 17 years to identify FLRs, due to its large coverage over the polar cap and auroral region. Specifications of the instrument as well as the algorithm used by this new technique will be explained in detail. As an example we will apply the technique to a known 1.9 mHz FLR that occurred on November 20th 2003 at 22:30-23:00 UT detected by the Prince George station. Discussion of the application of this technique to automatically detect other events, and the future statistical analysis of all events identified will be presented.

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