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# Field-line resonance characterization with a wave telescope technique

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We present theory and results of the first automated application of a new field-line resonance (FLR) characterization technique, the Field-Line Resonance Detector (FLRD), to ground-based magnetic field data from the Canadian magnetometer array CANOPUS, now operated as the CARISMA magnetometer array (www.carisma.ca). The FLRD is an adaptation of the wave telescope, which is a beamforming technique capable of computing the spectral energy density of a wave field, measured at a sparse array of stations, in wave vector space with high resolution. FLR wave phase structures can be described by five parameters: the frequency of pulsation, the phase shift in meridional direction over the resonance region (usually 180 degrees), the width of this phase shift area and its latitudinal position as well as the azimuthal wavenumber. Using a model which takes these parameters into account, we were able to adapt the wave telescope for the detection of these wave structures. Hence, the FLRD enables us to determine the spectral energy density of a wave field in the five dimensional FLR parameter domain and as a result to correctly identify one or more superposed FLR structures. We used this tool for the automated detection and characterization of FLR events in one year (2002) of ground based magnetic field data from the CANOPUS array. The results are in good agreement with previous automated statistical studies. In contrast they display a much higher detection efficiency due to fact, that the FLRD does not rely on the recognition of the relative phase distribution in meridional direction expected for FLR events, but estimates the contributions of FLR wave structures,

coherent across the array of stations, to the measured pulsations. Therefore it is able to discern these superposed structures in pulsation events, that would otherwise be dismissed.