Investigation of field-line resonance structure by using the dual station H ratio and the phase gradient techniques at L~1.3

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In order to investigate features of the field line resonance close to the Earth, we installed three magnetmeters at L~1.3 with Tohoku Institute of Technology and Tohoku University, and observed geomagnetic pulsations in the Pc range. Each adjacent stations were seperated by 50~100 km. The magnetic field data from these stations were analyzed by using the two techniques, the dual station H ratio technique and the phase gradient technique. As a result, we found Pc3 pulsations whose frequency decreased with decreasing geomagnetic latitude; we infer that this freature was caused by heavy ion mass loading to low-L field lines.

We will present and discuss this and other observed features.

In ground-based observations of the field-line resonance phenomena, it is known that the amplitude of the H-component perturbation reaches a maximum at the resonant point, and that its phase jumps by 180 degrees across the resonant point. These properties are of use for determing the frequency of ULF pulsations that form standing waves in the magnetosphere. The phase gradient technique and the dual-station H ratio technique identify these properties as follows.

The phase gradient technique is to calculate the dynamic spectra of the phase difference between the H-component data obtained at two neighboring stations along a magnetic meridian. The phase difference is expected to become the largest when the resonance point is located at the center between the two stations.

The dual station H ratio technique is to calculate the dynamic spectra of the ratio of the H-component data obtained at two neiboring stations along a magnetic meridian. The resonance above the station at the numerator of the ratio is expected to cause a maximum in the ratio, and the resonance above the station at the denominator of the ratio is expected to cause a minimum in the ratio.

If the dynamic spectra of the phase difference is plotted as a function of frequency, it will show a unipolar structure, as stated above. Then, we can determine the frequency of its peak to be the resonant frequency at the central point between the two stations. Similarly the dynamic spectra of the H-component ratio will show a bipolar structure. Then we can decide the frequency at the center of the bipolar peaks to be the resonant frequency at the central point between the two stations.

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