AMATERASによって観測された太陽電波IV型バースト中のzebra patternの出現特性

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Spectral fine structure of type IV solar radio bursts observed with AMATERAS: Characteristics of Zebra Pattern

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Type IV burst is a continuum radio emission that emanates from closed magnetic structures and often exhibits a variety of complex spectral fine structures such as broadband pulsations, narrowband spikes, fiber bursts and zebra patterns (hereafter ZP). Since these fine structures are thought to be caused by some inhomogeneities or modulations of wave generation and/or radio propagation processes, their spectral characteristics have significant information about plasma parameters and plasma processes in the solar corona. In particular, ZP has a characteristic spectral pattern with drifting narrow stripes of enhanced emission superimposed on the background type IV burst. Although several models for the generation of ZP have been proposed so far, the generation mechanism has not been revealed well yet. The purpose of this study is to investigate the generation mechanism and the propagation process of ZP.

We analyzed an event on June 21, 2011 observed with AMATERAS (the Assembly of Metric-band Aperture Telescope and real-time Analysis System). AMATERAS is a solar radio telescope for spectropolarimetry in the metric wavelength range developed by Tohoku University (Iwai et al., 2012), which can distinguish fine spectral structures of solar radio bursts with high time and frequency resolutions. The observed type IV burst on June 21, 2011 was emitted in association with C7.7 class flare and halo CME. In this event, ZP appeared around 200 MHz with about 30 stripes and its drifting envelope looks like type III bursts. The emission accommodated right-handed and the left-handed polarized components and the left-handed polarized components showed a significant time delay to the right-handed component by about 100 ms and the delay increased with an increment of the frequency. The delay can be interpreted by the difference of the group velocity between O-mode and X-mode waves, which propagate through the dense plasma structure of CME. In this presentation, we will show characteristics of the time delay of two modes and also discuss their possible generation processes.