R007-10
C 会場 ：9/25　AM2 （10:45-12:30）
11:45〜12:00

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Electron acceleration at quasi-perpendicular shocks above and below the whistler critical Mach numbers

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Non-thermal electrons with power-law energy spectra are directly observed at the quasi-perpendicular Earth's bow shock. Analysis of Geotail data at the Earth's bow shock showed hard spectra of electrons in the supercritical regime, where the upstream Alfven Mach number, M_A, is above the so-called whistler critical Mach number (Oka et al., 2006). However, the underlying mechanism of the power-law formation remains unclear in the supercritical and subcritical regimes. In this study, we performed several runs of 1D particle-in-cell simulations of quasi-perpendicular shocks with shock angles ranging from 65 to 85 degrees and M_A from 3 to 8. The upstream plasma beta is 0.3 and ion to electron mass ratio is 625. In the subcritical regime, the simulations showed that high-energy electron can penetrate upstream. This behavior is correlated with the presence of whistler wave trains emitted towards the upstream region. On the other hand, in the supercritical regime, the high-energy electrons are generated locally in the narrow region of the overshoot magnetic field. The electrons are accelerated via Landau resonance with the electrostatic field of the phase-standing whistler wave embedded in the overshoot magnetic field. We will compare the statistics of electrons, such as energy spectra, spatial and pitch-angle distributions of high-energy electrons, between the supercritical and subcritical regimes. Furthermore, we will discuss the electron acceleration mechanisms, by analyzing the trajectories of highly accelerated electrons in both regimes.