S001-06
A 会場 ：11/4　PM1 （13:45-15:30）
15:10〜15:25

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Electron betatron and shock drift acceleration at reforming quasi-perpendicular shocks

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Energetic, non-thermal electrons are directly observed in the vicinity of Earth's quasi-perpendicular bow shock. While Shock Drift Acceleration (SDA) model has been considered important for producing non-thermal electrons out of the solar wind thermal population, SDA alone does not seem to explain all observed features. Here we show, using 1D PIC simulations of a quasi-perpendicular collisionless shock (Alfven Mach number 7.1, shock angle 70 degrees, plasma beta 0.3, and ion-to-electron mass ratio 625), that there are additional electron acceleration mechanisms associated with the nonstationary self-reformation process of supercritical shocks. The analysis is performed by separating and quantifying all acceleration and deceleration processes including the effect of cross-shock potential. We found that incoming electrons, trapped in a thin, time-evolving magnetic trough embedded in the overshoot magnetic field, gains a perpendicular energy via non-adiabatic betatron acceleration. The electrostatic component of the phase standing oblique whistler wave in the overshoot is mainly responsible for the betatron acceleration. SDA still occurs simultaneously due to not only the motional electric field but also a time-varying electric field along the shock front generated in the overshoot. We will discuss the acceleration processes depending on the Alfven Mach numbers of 3.5 -7.1 and shock angles of 65 and 85 degrees.