

Inter-scale coupling in a self-reformation process of quasi-perpendicular shocks

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Basic structures of quasi-perpendicular collisionless shocks are controlled not only by ion dynamics but also by electron dynamics. While ion dynamics mostly determines relatively large scale structures in terms of a self-reformation process, small scale structures with length scale of about electron inertial length or less in the foot are sustained by electron dynamics. The lowest order coupling between these two different scale phenomena appears as excitation of microinstabilities in the transition region, since a local nonequilibrium distribution function causing the microinstabilities is produced by presence of reflected ions. When amplitudes of the generated small scale waves become large enough, on the other hand, some influence on the self-reformation processes is expected to occur. Here, influences of the microinstabilities in the foot on the self-reformation processes are investigated by utilizing full particle simulations.