# Dynamical Transition of Josephson Vortex Lattice in Serially Stacked $Bi_2Sr_2CaCu_2O_{8+x}$ Intrinsic Josephson Junctions

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The inductive coupling theory in serially stacked $Bi_2Sr_2CaCu_2O_{8+x}$ intrinsic Josephson junctions predicts that the lattice structure of the Josephson vortices along the *c* axis gradually changes from the triangular to the rectangular lattice with increasing the vortex velocity. This lattice transition appears as voltage jumps or sub-branches in the Josephson vortex-flow region of current-voltage characteristics (IVC). We report the IVC in external magnetic fields from 8 kG to 3 T. The stack, with the lateral size of $15\times1.4$ $\mu m^2$, was fabricated by using the double-side cleaving technique. Around 1 T, we were able to observe Josephson vortex-flow characteristics between a few neighboring lowest-voltage quasiparticle branches. The sub-branches in the Josephson vortex-flow region, corresponding to a plasma propagation mode in serially coupled intrinsic Josephson junctions, were also observed in the range of 2 – 3 T. Switching from one branch to another in Josephson vortex-flow region suggests the structural transition of the moving Josephson vortex lattice.

keywords : Josephson vortex lattice, sub-branch splitting, Cherenkov radiation