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Resonance-like behaviors of Josephson vortex flow resistance in mesoscopic intrinsic junctions of $Bi_2Sr_2CaCu_2O_{8+\delta}$ ITSUHIRO KAKEYA, MIYAKO IWASE, TAKUYA YAMAZAKI, TAKASHI YAMAMOTO, KAZUO KADOWAKI, University of Tsukuba — We have investigated dynamical nature of the Josephson vortex (JV) lattice in $Bi_2Sr_2CaCu_2O_{8+\delta}$ (Bi2212) by measuring the Josephson flux flow $R_{ff}(H)$ and the current-voltage $(I-V)$ characteristics along the c axis as a function of magnetic field parallel to the ab plane. The field dependence of the critical current $J_c(H)$ derived from the $I-V$ measurements oscillates as a function of H, similar to $R_{ff}(H)$ at a low current ($\sim$ 5 A/cm^2), indicating the dynamical formation of triangular lattice in low field and the square lattice in high field. In higher currents, $R_{ff}(H)$ strongly depends on the c axis currents: at a field where $J_c(H)$ shows a maximum, $J_c(H)$ shows a minimum under a certain current and vice versa. This phenomenon can be interpreted as the formation of the resonance-like mode of the Josephson vortices, and is attributed to the phenomenon like Fiske resonance. This implies that Josephson vortices driven by the static current generate electromagnetic waves which resonate with Josephson vortex lattices in a mesoscopic junction.

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