Abstract Submitted
for the MAR05 Meeting of
The American Physical Society

Josephson flux flow resistance in single crystalline $Bi_2Sr_2CaCu_2O_{8+\delta}$ in various rectangular geometries KAZUO KADOWAKI, ITSUHIRO KAKEYA, MIYAKO IWASE, TAKUYA YAMAZAKI, TAKASHI YAMAMOTO, Institute of Materials Science, Univ. of Tsukuba — Josephson flux-flow resistance $\rho_c(H, I, \theta)$ has been studied in single crystalline $Bi_2Sr_2CaCu_2O_{8+\delta}$ with various rectangular geometries (more than 20 samples) as functions of magnetic field intensity H, current I and the magentic field orientation angle θ with respect to the CuO_2 plane. We observed a clear evidence of the lock-in behavior of the Josephson vortex parallel to the CuO_2 planes. It is found that this lock-in angle θ strongly depends on the sample dimension, especially, on the length ℓ parallel to the magnetic field and is inversly propotional to the $\sqrt{\ell}$. This can be understood by considring the torque energy and energy to create pancake vortices very well. The flux-flow resistance ρ_c shows a characteristic oscillatory behavior as a function of H with a well defined peariodicity of $H = \phi_0/2sw$ in low fields and $H_0 = \phi_0/sw$, where s is the layer distance and w is the width of the sample perpendicular to the magnetic field. This oscillatory behavior changes dramatically as a function of I and can be explained by the dynamical ordering of the Josephson vortices in the restricted rectangular dimensions, which impose a potential well to the Josephson vortices.

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Date submitted: 20 Mar 2013 Electronic form version 1.4