

Abstract Submitted  
for the MAR09 Meeting of  
The American Physical Society

**Effect of pseudo-gap state to the vortices in the high-Tc cuprate superconductors**<sup>1</sup> MASARU KATO, SATOSHI TOMITA, Osaka Prefecture University — The scanning tunneling spectroscopy (STS) experiments for high-Tc cuprate superconductors(SC) show the local density of states (LDOS) around a single vortex is different from that in a purely d-wave superconductor (dSC). Theoretically, in the dSC, there is a quasi-particle bound states peak around the vortex core, which is similar to that for an s-wave superconductor. This discrepancy means the superconductivity in high-Tc superconductors is simple dSC. In the high-Tc SC, dSC always coexists with unknown pseudo-gap state. Recent angle-resolved photoemission spectroscopy experiments show the energy gaps of pseudo-gap states and d-wave superconductivity is different. In this study, we show that the quasi-particle structure is reproducible theoretically, if we take into account the effect of the pseudo-gap state. We consider d-spin density wave ( dSDW) state as the pseudo-gap state. We derived the Bogoliubov-de Gennes equation for the coexistence state with dSC and dSDW. And solving it numerically, we obtained the LDOS, which reproduce the experimental LDOS, qualitatively. This result shows that the pseudo-gap state affect the dSC, especially the bound state in the vortex core, in high-Tc SC's.

<sup>1</sup>This work is supported by the FI program of Osaka Prefecture University.

Masaru Kato  
Osaka Prefecture University

Date submitted: 21 Nov 2008

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