Abstract Submitted
for the MAR07 Meeting of
The American Physical Society

Ground state of interlayer Josephson vortex systems and the shear modulus YOSHIHIKO NONOMURA, XIAO HU, Computational Materials Science Center, National Institute for Materials Science, Tsukuba, Ibaraki 305-0047, Japan — Ground state of interlayer Josephson vortex systems is investigated on the basis of the full Lawrence-Doniach model. We find: (1) For low fields, field dependence of c_{66} approximately coincides with the elastic theory, and jumps in c_{66} correspond to the structural phase transitions between various rotated-lattice configurations. (2) For intermediate fields, the ground state is characterized by continuously-varying shearing angle of vortex lattices. In this region c_{66} becomes smaller than those in the elastic theory, and vanishes at the shear instability field. This critical field is increased by inhomogeneity of the magnetic field. (3) For high fields, c_{66} converges to a constant value, which is quite different from the exponentially-decaying c_{66} in the London theory. This saturation of c_{66} can be interpreted as the effect of "effective core size" within the elastic theory, and is not affected by inhomogeneity of the superconducting amplitude for material parameters of cuprate high-T_c superconductors.

Yoshihiko Nonomura
Computational Materials Science Center
National Institute for Materials Science, Tsukuba, Ibaraki 305-0047, Japan

Date submitted: 06 Nov 2006 Electronic form version 1.4