Abstract Submitted
for the MAR06 Meeting of
The American Physical Society

Origin of the resistance and critical current oscillations in superconducting films with hole arrays U. PATEL[1], Argonne National Laboratory, Z.L. XIAO, J. HUA, T. XU, D. ROSENMANN, V. NOVOSAD, U. WELP, W.K. KWOK, G.W. CRABTREE — The resistance and critical current of a superconducting film containing a regular array of microscale or nanoscale holes are found to oscillate with magnetic field. These oscillations are generally interpreted as commensurate pinning. On the other hand, oscillations of the critical temperature of such films with magnetic field due to the Little-Parks effect can also induce oscillations of the resistance and critical current. We present a new method to separate the contributions of commensurate pinning from the Little-Parks effect in superconducting niobium films containing triangular lattices of holes with diameter of tens of nanometers. Remarkably, we find the oscillations of the resistance and critical current with respect to field and temperature to originate purely from the Little-Parks effect. Details on sample preparation, morphological characterization and transport measurements of the critical temperature, the resistance and critical current will be reported.

[1]Also at Northern Illinois University

Umeshkumar Patel

Date submitted: 07 Dec 2005 Electronic form version 1.4