Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Non-linear Time Effects in Superconducting Polycrystalline MgB_2 MURAT OLUTAS, ATILGAN ALTINKOK, ATILLA KILIC, KIVILCIM KILIC, Abant Izzet Baysal University — The time evolution of the voltage response (V-t curves) to a symmetric bi-directional square wave (BSW) current with long periods (P) applied to the MgB_2 sample was investigated at low dissipation levels. It was observed that regular sinusoidal-like voltage oscillations evolve at certain ranges of the amplitude (I_{BSW}) and period (P_I) of the BSW current, external magnetic field (H), and temperature (T). The regular sinusoidal-like oscillations were interpreted in terms of the dynamic competition between pinning and depinning processes. In this process, the interaction between flux lines and pinning centers could be elastic coupling because of rigidity of flux line lattice in MgB_2. We suggest that the oscillating mode can be related to the drifting of flux lines which are in motion. In this case, due to the strong pinning and complex relaxation effects, the majority of flux lines traversing the sample does not leave it entirely and remains in an oscillating mode by moving forth and back as a function of time. We suggest that the flux dynamics associated with the oscillating mode is the ordered motion of defective flux line system. Fast Fourier Transform analysis of V-t oscillations showed that the period of oscillations is comparable to that of the BSW current. The oscillating mode was also discussed in terms of sliding charge density waves (CDWs).

Murat Olutas
Abant Izzet Baysal University

Date submitted: 11 Nov 2011 Electronic form version 1.4