

Vortex Dynamics in Nickel-borocarbides and Magnesium-diborides using NMR Measurements

K. H. Lee^a, K. H. Kang^a, B. J. Mean^a, K. H. Han^a, Moohee Lee^{*,a}, B. K. Cho^b

^a Konkuk University, Seoul, Korea

^b Kwangjuo Institute of Science and Technology, Kwangjuo, Korea

Pulsed nuclear magnetic resonance (NMR) measurements have been performed on single crystals of RNi_2B_2C ($R=Y, Lu$) superconductors to investigate vortex structure and dynamical behavior. Spectrum, linewidth and transverse relaxation rate $1/T_2$ of ^{11}B and ^{13}C NMR are measured down to 3.8 K in a field range of 1 – 8 T. With lowering temperature below T_c , ^{11}B NMR spectrum, shift, linewidth, and transverse relaxation rate exhibit distinct features, from which three vortex phases are identified; namely, vortex lattice, glass, and liquid. Also, motional narrowing of linewidth and double-peak structure of $1/T_2$ indicate significant thermal motion of vortices in this low T_c and nearly isotropic 3D superconductors. On the other hand, same measurements for magnesium diborides show less pronounced changes of NMR data regarding vortex dynamics. These results will be compared with vortex dynamics for cuprate superconductors.

keywords : Vortex dynamics, NMR measurements, Nickel-borocarbides, Magnesium diborides