Measurements of the anisotropic irreversibility field in the electron-doped high-T$_c$ superconductor Pr$_{2-x}$Ce$_x$CuO$_{4-y}$ GUOQING WU, W.G. CLARK, S.E. BROWN, UCLA, R.L. GREENE, U. Maryland, H. BALCI, U. of Illinois, Urbana, A.P. REYES, P. KUHNS, W.G. MOULTON, NHMFL, Tallahassee — We report measurements of the irreversibility field ($H_{irf}$) in single crystals of the electron-doped high-T$_c$ superconductor (HTSC) Pr$_{2-x}$Ce$_x$CuO$_{4-y}$ ($x = 0.15$ and 0.17) with an applied magnetic field ($B_0$) up to 28 T, using the method of the shift in a nuclear magnetic resonance (NMR) probe circuit resonance frequency ($f$) caused by the susceptibility of the sample. It is observed that $H_{irf}$ is highly anisotropic, and that as the temperature $T \to 0$ the upper critical field [$H_{c2,∥c}(T \to 0)$] at $B_0 \parallel c$ is far less than the Pauli limit and very different from that at $B_0 \perp c$. A phase diagram that involves the vortex solid and/or vortex liquid states depending on the alignment of $B_0$ relative to the lattice c-axis is proposed, and the obtained anisotropic $H_{c2}$ character along with the evaluated zero $T$ coherence length [$\xi_{ab(c)}(T \to 0)$] and penetration depth [$\lambda_{ab(c)}(T \to 0)$] at $B_0 \parallel ab(c)$ is compared with that of hole-doped HTSCs. This work is supported at UCLA by NSF Grants DMR-0334869 (WGC) and 0520552 (SEB), at U. Maryland by 0352735 (RLG), and NHMFL by 0084173 and the State of Florida.

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