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The effect of impurities on the Superheating field of Type II superconductors[1] FAREH PEI-JEN LIN, ALEXANDER GUREVICH, Department of Physics, Old Dominion University — We calculate the superheating field $H_s(T)$, the maximum field at which the Meissner state exists, for a type-II, single band s-wave superconductor with nonmagnetic and magnetic impurities. $H_s(T)$ was calculated for the entire temperature region $0 < T < T_c$ and arbitrary impurity concentrations by solving the Eilenberger equations for the large Ginzburg-Landau parameter. We show that, although the effect of nonmagnetic impurities on H_s is relatively weak, they give rise to a maximum in $H_s(T, c)$ at a concentration c corresponding to a moderately clean limit. Impurities significantly affect the density of states at $H = H_s$: in the clean limit the superheating field corresponds to a gapless state, but above a critical concentration $c > c_g$, the quasiparticle gap $E_g(c)$ appears at $H = H_s$ so that $E_g \sim 0.410\Delta$ in the dirty limit. This feature can be important for the nonlinear surface resistance at strong rf fields $H \sim H_s$.

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