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Parallel Critical Fields and Inductive Critical Currents in Nb/Cr bilayers PHILLIP BROUSSARD, AMY DAVIS, Covenant College — Measurements of parallel critical field and inductive critical currents in Nb/Cr bilayers have been carried out. The films were grown by magnetron sputtering onto room temperature silicon substrates from separate sources. Bilayers with either varying Nb or Cr layer thicknesses were studied. Parallel critical fields were measured using resistive method and inductive critical currents were measured using a third harmonic technique at 1 kHz. We see evidence of 2D behavior in the parallel critical fields and the results indicate that the moderately dirty limit of V. Kogan (Phys. Rev. B 32,139 (1985)) needs to be taken into account. J_c varies as $(1-t)^\gamma$ with γ being $\approx$ 1.4 for constant Nb thickness bilayers, but decreasing as the Nb thickness decreases. (Here t is the reduced temperature, T/T_c). Our pure 50nm Nb film had a T_c of 9.0 K with an inferred $J_c(0)$ of 22 MA/cm^2. There is a decrease in $J_c(0)$ as the Cr layer increases, but the question of whether this is due to an actual reduction or if the superconductivity is remaining in the Nb layer only is still open for these films. This will be discussed.

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