

Conductivity and the Microwave Properties of 81-Permalloy Thin Films (Correspondence)

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The microwave properties of 81-Permalloy (81 percent nickel-19 percent iron) films less than 1050 Å thick and without an external magnetic field have been studied at 10 GHz. The measured dc conductivity values σ_{dc} were approximately one-half the values (σ_{dc}) predicted by the Fuchs-Sondheimer (F-S) theory for monovalent metals, and an indirect check was obtained by comparing measured reflection and transmission coefficients (R and T) with values calculated using σ_{dc} and σ_{ac} . The power transmission coefficient was obtained from the insertion loss, and calculated values of insertion loss using σ_{dc} agreed within 2 percent with directly measured values. Calculated values of R using σ_{dc} showed good agreement with directly measured values for film thicknesses less than 300 Å, but with thicknesses between 300 Å and 1050 Å the directly measured values of R were up to 5 percent smaller than those predicted using σ_{dc} . Using the F-S conductivity, calculated values of T were approximately an order of magnitude lower than directly measured values, and calculated values of R were as much as 13 percent higher than directly measured values.

 [Return to main document.](#)