

Fields and Waves I – Fall 2000
Preparation Assignment due October 23, 2000

1. A material has conductivity σ and permittivity ϵ . It is in an electric field of frequency ω . Find the ratio of the conduction current to the displacement current.
2. We often ask if a material a good conductor or a good insulator. We see from question 1 that this depends on the frequency. For copper $\sigma = 5.8 \times 10^7$, $\epsilon = \epsilon_0$ and for Teflon $\sigma = 3 \times 10^{-8}$, $\epsilon = 2.1\epsilon_0$. For a frequency of 1 megahertz determine if copper and Teflon are good conductors or good insulators. What is a general criterion we can use?