

EE 151

Quiz #1

Question:

We know that inside perfect conductors the electric field must be zero. Show that the time varying magnetic field must also be zero inside a perfect conductor. How about static magnetic fields?

Answer:

We know from Faraday's Law that:

$$\nabla \times \vec{E} = -\mu \frac{d\vec{H}}{dt}$$

Therefore, since E is zero inside the conductor, then the derivative in time of H (The magnetic field) is also zero. Thus, there are no time varying magnetic fields inside a perfect conductor.

Static magnetic fields can exist in perfect conductors since Faraday's law is not violated in this case.