Chapter 2

Theory of Shielding

The theory of shielding [1] begins with the generation of an electromagnetic (EM) wave. This is accomplished with the use of two (2) of Maxwell's equations and class notes from a 1960 UCLA course on EM theory. The result is a wave consisting of lines of flux (defined as displacement current dD/dt) that radiates away from the source. This displacement current generates the E and H fields, where the value of the H field in A/m is equal to the value of the displacement current. When the wave is impinged onto a shielding barrier, the current (displacement current) in the wave is coupled to the barrier. The current coupled to the barrier (surface current density J_s) is attenuated by skin effect, where the values of the E and H field in the barrier are attenuated equally. The value of the E and H fields that exit the barrier is equal to that at the exit surface of the barrier. If there is an EMI gasketed seam in the shield, the surface current density J_s that crosses the seam will create a voltage across the seam. The value of the wave that penetrates the seam is directly proportional to that voltage [2].

References

1. Kunkel G (2016) A circuit theory approach to calculating the attenuation of shielding barriers, Interference Technology Magazine
2. IEEE EMCs Education Committee, Experiments Manual