High Frequency in Enclosure Algorithm

Subroutine: *HF*(V_s, *string*, *flag*). Where, V_s is the voltage of noise source, *string* is the name of components or nets and *flag* is 0 for nets or 1 for components. The subroutine returns an estimate of the radiated electric field strength.

Purpose of Algorithm

To estimate the radiated field due to a noise source in a shielding enclosure

Basic Description of Algorithm

Even though it is difficult to accurately predict the radiated field due to a noise source in a shielding enclosure, an approximate closed-form expression for the radiated EMI from shielding enclosure with small apertures is available [1]. This algorithm uses following formula to estimate the maximum radiated electric field strength.

$$|E|_{\max} = 1.8\times10^{-13}\cdot N\, V_s\, L^3\, f^{1.5}\cdot\sqrt{Q/R_s V} \qquad (1)$$

where, f : frequency [Hz]

N : the number of slots

L : slot length

V : enclosure volume

Q : the Q of the enclosure

V_s : the voltage of the noise source

R_s : noise source impedance

All the terms are expressed in mks units.

Assumptions

- The enclosure resonates at the given frequency considering the worst case. Estimate may high.
- The ratio of slot length to slot width is approximately 10.
- The length of slot is electrically short.
- The shape of enclosure is rectangular.
- Noise source is placed at least 1~2 cm away from the wall of the enclosure.

Implementation Details

Enclosure parameters should be specified in the personality file.

References

[1] M. Li, J. Drewniak, S. Radu, J. Nuebel, T. Hubing, R. DuBroff and T. Van Doren, "An EMI estimate for shielding-enclosure evaluation," *IEEE Transactions on Electromagnetic Compatibility*, vol. EMC-43, no. 3, Aug. 2001, pp. 295-304.