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 estimate of radiated field.

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

Basic Description of Algorithm
Even though it is difficult to predict accurate radiated field by the noise source in a shielding enclosure, approximate closed-form expression of the radiated EMI from shielding enclosure is available [1]. This algorithm uses following formula to estimate the maximum radiated field.

\[ |E|_{\text{max}} = 1.8 \times 10^{-13} \cdot N \cdot V_s \cdot f^{1.5} \cdot \sqrt{\frac{Q}{R_s}} \cdot V \]

(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 printed circuit board or the wall of the enclosure.
- The dimension of noise source is greater than \( l/10 \).

Implementation Details
The accuracy of this algorithm depends on the parameters of the enclosure. Enclosure parameters should be specified in the personality file.

References