A Simulation Tool for the Stochastic Electromagnetic Field Coupling to a Uniform Transmission Line

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***Abstract*—A statistical tool will be presented that allows to calculate the differential-mode current coupled to a transmission line using a stochastic plane wave excitation in the frequency domain. The field model is based on a Monte Carlo approach that approximates the well-known plane wave integral representation for fields inside reverberation chambers. A fixed stirrer position or a fixed electromagnetic boundary condition is formed by a certain number of plane waves with random wave vectors, polarizations and phases. A given number of boundary conditions can be simulated and the mean value, the standard deviation, the probability density function, the cumulative distribution function, or the correlation of the current along the line can be analyzed. The dimensions of the straight and uniform double wire transmission line as the length, the line separation and the wire radius can be arbitrarily adjusted. Variable resistances can be set to terminate both line end. The average electric field strength inside the reverberation chamber can be defined in terms of the quality factor, the input power and the chamber volume. Many numerical results can be compared to analytical expressions from the literature. The tool was developed in MATLAB and features a multilingual graphical user interface.**

***Keywords*—electromagnetic coupling; statistical fields; reverberation chambers; statistical distributions; transmission lines; correlation; differential-mode current**

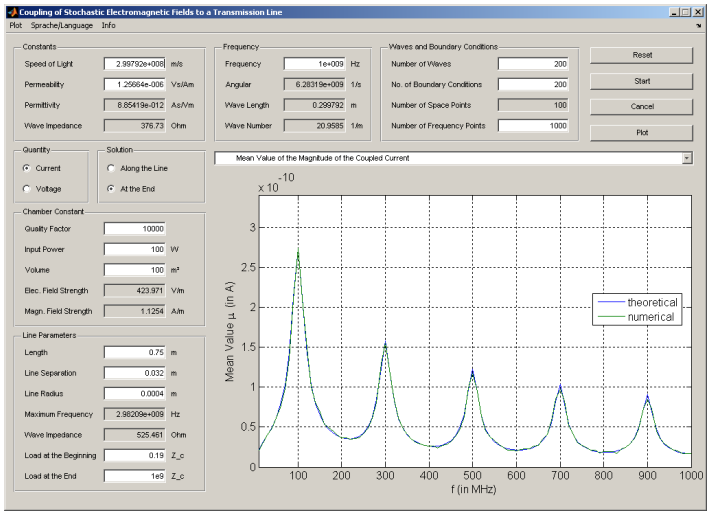

Figure 1. Screenshot of the graphical user interface.

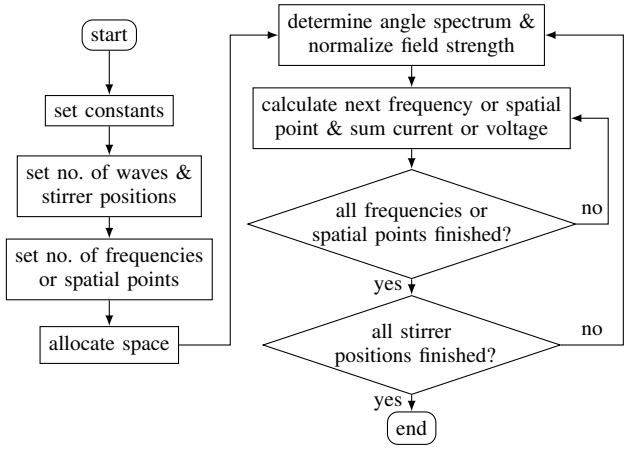

Figure 2. Schematic of the program flow chart of the field generator.

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