SIMULIA CST STUDIO SUITE SPARK3D DATASHEET

The leading RF Breakdown analysis tool

SIMULIA CST STUDIO SUITE SPARK3D

Simulia CST Studio Suite Spark3D is the most powerful software tool for RF breakdown analysis available on the market today. It is based on accurate numeric algorithms for predicting both gas discharge (also known as Corona discharge) and Multipactor breakdown onsets, which are two of the main high power effects that can severely damage passive RF devices. Spark3D supports the designing/manufacturing industries to decrease both the time to market and the development costs of the next generation of communication systems.

MAIN FEATURES

Versatile and powerful—Spark3D is able to import the electromagnetic fields computed with some of the most widespread electromagnetic simulation software tools like Simulia CST Studio Suite®, Simulia CST Studio Suite Fest3D® and ANSYS® HFSS™.

Easy to use—Spark3D is designed to minimize the required user intervention; in many cases, the pre-defined options and parameters are enough to obtain accurate results.

Fully-developed GUI—An intuitive Graphical User Interface allows the user to easily set up a simulation and visualize the results, even during the run-time.

Accurate—Hundreds of high power tests have been done to crosscheck Spark3D simulations, demonstrating high accuracy within the expected margins.

MULTIPACTOR ANALYSIS

The Multipactor module is mainly based on an efficient full 3D electron tracker and a sophisticated electron emission model for the characterization of the surfaces. This technique allows the analysis of multipactor in complicated structures that involve arbitrary shapes in short computational times. Some of the most relevant features of the multipactor analysis in Spark3D are:

- Automatic multipactor threshold determination
- Multipactor analysis in the case of single-carrier, multi-carrier and modulated signals
- Possibility of using predefined, user-defined and imported surface material properties
- Automatic optimum initial electron seeding distribution
- 3D output surface statistics to identify the discharge location and understand the nature of the discharge
- Possibility to add external electric and/or magnetic DC fields to the RF field
- Visualization of the electron motion in the device

GAS BREAKDOWN (CORONA DISCHARGE) ANALYSIS

The Corona module in Spark3D uses a Finite-Element technique to solve the electron density continuity equation. This approach allows the accurate analysis of gas breakdown in complicated structures in short computational times. Some of the most relevant features of the corona analysis in Spark3D are:

- Automatic breakdown threshold determination for a chosen pressure range
- Possibility of using different gasses: dry Air, Nitrogen, Helium, Argon, SF6 and CO2
- High pressure breakdown estimate based on a fast analytical calculation
- Analysis of corona discharge at a fixed input power
- Visualization of the discharge formation to identify the location of the breakdown

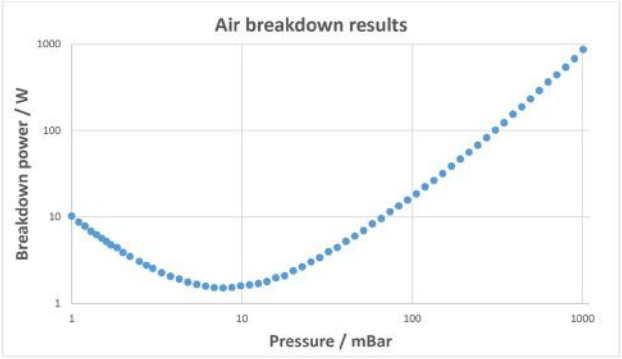

Fig 1. Main output of corona analysis in Spark3D: Breakdown power level as a function of the pressure.

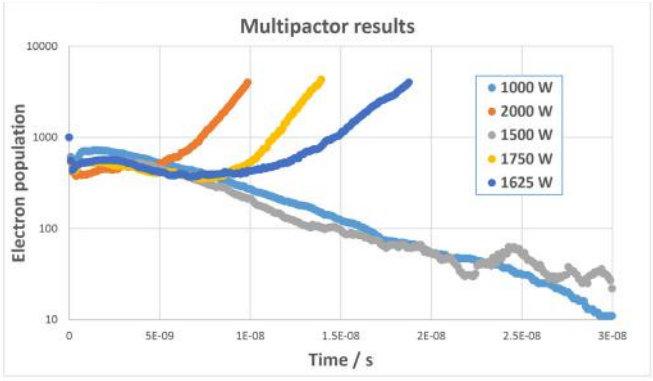

Fig 2. Main output of multipactor analysis in Spark3D: Electron population evolution with time for different input power levels. Based on this, Spark3D automatically detects the discharge and determines the breakdown power threshold.

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