



Contribution ID: 192

Type: Oral Presentation

Ferrimagnetic Material Testbed for Coaxial Nonlinear Transmission Lines

Friday 8 July 2016 11:15 (15 minutes)

Ferrimagnetic-based nonlinear transmission lines (NLTLs) are actively researched as potential compact, phaseable sources of high power microwaves for various applications. The performance of the nonlinear microwave conversion process in gyromagnetic NLTLs is heavily dependent upon the properties of the ferrimagnetic materials and line geometries. A test bed for NLTL development has been constructed to support ferrimagnetic material and line geometry evaluation. The test bed has been designed to support rigorous testing sequences of each material to determine optimal operating efficiencies and power handling capabilities for incorporation into NLTL-based systems. The test bed is driven by a parallel plate Blumlein generator capable of 15ns pulse width, 100kV amplitude, and tuneable risetimes from 1 to 20 ns. Evaluation of pressurized gasses, oil, and solid dielectrics for high voltage line insulation has been conducted. Additionally, several custom electrical diagnostics have been developed to support the high voltage (>60 kV) and high frequency (100 MHz –6 GHz) requirements. This presentation will discuss the test bed topology, custom diagnostic construction and evaluation, and preliminary results.

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Session Classification: Oral 10

Track Classification: High Power Microwaves