Pulse Excitation of a Large GTEM Cell

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We have investigated the possibility of adapting the existing GTEM-3750 for transient excitation. Several design parameters have been studied in attempting to answer the following questions.

1. What are the maximum field strengths that can be achieved at the Device Under Test (DUT) position depending on various additional investments e.g. pressurized source, use of SF_6 ?
2. What modifications are needed for higher field strengths?
3. What are the limiting factors for the field strength?
4. Could we achieve field strength of 100 kV/m at the DUT position?

It is noted that the GTEM-3750 is about 15.4m long and the largest cross section at the termination end is approximately 5.5m high x 8.3 m wide. We further note that the height of the septum in the region of the test volume is about 3m. On an average, transient source amplitude of 300 kV can produce about 100 kV/m electric field. Conservatively, let us set a goal of 400 kV as the maximum source amplitude. Estimates of relevant SF_6 breakdown fields have been gathered from the literature. Those breakdown estimates have been combined with electric field simulations of various locations of the GTEM-3750 feed to estimate the SF_6 pressure required to avoid electrical breakdown.

The estimated pressure requirements have been used to develop a concept for a new GTEM-3750 feed that incorporates two new pressure barriers and revised outer conductors. All of the necessary modifications to the existing GTEM Cell for pulse excitation have been worked out and will be described in detail.