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Calculation of Magnetic Field using Finite Element Method

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Abstract: *The increasing demand for electricity in various cities has necessitated extending high-voltage networks closer to end- users. In Gas Insulated Systems (GIS), solid insulating materials are crucial for separating compartments and providing mechanical support for conductors. A significant percentage of failures in GIS can be attributed to improper spacer design, which leads to internal field discharges.*

The triple junction point, where the solid insulating spacer interfaces with SF6 gas, is particularly vulnerable. This junction is the weakest point in GIS, as the breakdown of SF6 gas insulation is negatively impacted by the presence of the spacer, especially at this critical location. Therefore, controlling electric stresses at the spacer surface is essential. To mitigate these stresses, improvements in spacer design are necessary. Factors influencing the electric field distribution on the spacer surface are analysed using the Finite Element Method (FEM), which offers higher accuracy compared to other approaches. This method is instrumental in optimizing spacer design and reducing electric field stresses in GIS.

Keywords: Spacer's shapes, Composite cone spacer, Triple junction point, Finite Element Method

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