

高电压技术

GIS开关电弧建模及其对VFTO波形的影响

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摘要:

研究开关电弧对气体绝缘变电站(gas insulated substation, GIS)中产生的快速暂态过电压(very fast transient overvoltage, VFTO)波形的影响, 对于确定GIS末端电压波形, 及用于验证设备抵御VFTO的绝缘强度有重要意义。采用电阻模型来模拟电弧, 并用电压源等效电弧电阻, 既适用于各种电弧电阻模型, 又可以简化开关的仿真建模。所得母线电压频域解为解析或半解析形式, 有助于提高解的准确度。以双曲线形式的电阻模型为例, 分析了开关电弧对GIS母线端VFTO波形的影响。该方法也适用于分析任意复杂GIS结构中开关电阻的影响。

关键词:

Modeling of GIS Switching Arc and Its Effect on VFTO Waveforms

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Abstract:

Study on the effect of switching arc on very fast transient overvoltage (VFTO) in gas insulated substation (GIS) is important to determination of the voltage at ends of the GIS busbar and verification of the VFTO withstand level of GIS and the related equipments. The modeling of switching arc for VFTO analyses is studied in this paper. The arc is represented as a time-variant resistance and modelled as an equivalent voltage source. The method is valid for arc modeling under various conditions, and produces remarkable simplification. Solutions of the node voltage at the ends of the GIS busbar are analytic or quasi-analytic in frequency-domain and have an increased accuracy. Based on the hyperbola type resistance model, the effect of the switching arc on VFTO waveform is analyzed in details. The method can be applied to the simulation of switching arc effect on VFTO in GIS with a complex structure.

Keywords:

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