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高电压技术

采用光谱诊断法测量长间隙空气电弧温度

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摘要：

电弧温度是表征长间隙空气电弧物理特性的重要参量。采用光谱诊断法测量长间隙空气电弧温度，为分析输电线路潜供电弧的自熄特性提供了依据。基于空气电弧等离子体辐射的光谱诊断原理，由附加光学预处理装置的高速图像采集系统来拍摄电弧图像，结合数字图像处理技术、阿贝尔(Abel)变换和光谱相对强度比色法，计算得到电弧等离子体的温度分布。研制了长间隙空气电弧温度的测量系统，对小电流电弧温度特性进行测试分析。结果表明，所提出的光谱诊断测温法能有效测量长间隙空气电弧等离子体的温度分布，为研究潜供电弧的自熄机制提供了重要手段。

关键词： 长间隙空气电弧 电弧温度 等离子体辐射 光谱诊断 阿贝尔变换 比色测温法

Temperature Measurement of Air Arc in Long Gap by Spectrum Diagnosis

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Abstract:

Arc temperature is an important physical parameter to present air arc characteristics in long gap. It was measured by spectrum diagnosis, which offers foundation for secondary arc self-extinction. Based on the spectrum principle for plasma radiation of air arc, arc films in long gap were taken by the corrected high-speed image sampling system with optical pretreatment instrument. With application of the numerical image process technology and Abel transform, the plasma temperatures were gotten by means of two-color thermometry with relative radiation strength. The temperature measurement system was developed for long air arc, and the temperature distributions of arc at low current were measured. All results show that the temperature measurement method for arc plasma is valid and reliable, which provides the tool to further analyze the plasma mechanism of secondary arc self-extinction.

Keywords: air arc in long gap arc temperature plasma radiation spectrum diagnosis Abel transform two-color thermometry

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