

高电压技术

电极间距对真空电弧电压及阳极熔池旋转速度影响的实验研究

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摘要: 在可拆卸真空灭弧室中对纯铜杯状纵向磁场电极分别进行了间距10, 16, 20 mm的大电流(有效值为10, 20 kA)燃弧实验, 用高速摄影仪拍摄电极间的电弧形态及阳极表面熔池的旋转运动, 并测量了电弧电压波形。以实验测量为基础, 分析研究了真空电弧在不同间距下的电弧电压特性、阳极表面熔池旋转运动。实验结果表明, 随着电极间距的增大, 电弧逐渐向不稳定态发展并且电弧电压逐渐增大。阳极表面熔池半径及金属液体旋转速度随着电极间距的增大而增大。电极间距10 mm的熔池旋转线速度大约为0.664 m/s, 熔池半径大约为14.5 mm; 而电极间距16 mm的熔池旋转线速度为1.204 m/s, 熔池半径大约为15.6 mm。

关键词: 真空灭弧室 纵向磁场 电弧电压 熔池旋转

Experimental Study on Effects of Electrode Gaps on the High-current Vacuum Arc Voltage and the Rotation Speed of Anode Melting Pool

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Abstract: High-current (10 kA rms, 20 kA rms) vacuum arc experiments were conducted in a detachable vacuum chamber for copper cup axial magnetic field (AMF) contacts with the electrode gaps of 10, 16 and 20 mm. The vacuum arc appearance and the rotation speed of melting pool were observed with the high-speed CCD video camera, and the arc voltage waveforms were measured at the same time. Based on the experimental measurement, the high-current vacuum arc voltage and characteristics of melting pool rotation on AMF contacts with different electrode gaps were analyzed. Experimental results showed that the arc tends to be unstable and the arc voltage gradually increases with increasing of the electrode gap, so do the radius and the rotation speed of the anode surface melting pool. The rotation speed of the anode melting pool is about 0.664 m/s and the metal pool's radius is about 14.5 mm with the electrode gap of 10 mm. In contrast, the rotation speed of anode melting pool is about 1.204 m/s and the melting pool's radius is about 15.6 mm with the electrode gap of 16 mm.

Keywords: vacuum interrupter axial magnetic field arc voltage pool rotation of melting

收稿日期 2009-12-03 修回日期 2010-02-09 网络版发布日期 2010-09-20

DOI:

基金项目:

国家自然科学基金项目(50907045, 50707022); 新世纪优秀人才支持计划项目(NCET-06-0830); 高等学校博士学科点专项科研基金资助项目(200806981052, 2009020111015)。

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