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论文

混合励磁同步发电机电压控制原理分析与实现

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摘要:

为解决永磁发电机输出电压不可控的问题,研究了一种新型结构的混合励磁同步发电机.利用有限元方法计算了电机中永磁和电励磁的磁场分布.根据对永磁发电机输出电压的要求,制定了励磁调节系统的控制策略,讨论了调节过程.为验证混合励磁同步发电机的电压调节能力,设计制造了2. 5 kW实验样机及励磁调节系统,并进行实验测试.结果表明:空载运行时,混合励磁同步发电机输出电压为永磁与电励磁部分的合成电势;负载运行时,随着负载的增加,通过调节励磁电流的大小改变了气隙磁通,输出电压稳定在135 V.

关键词: 混合励磁 同步发电机 原理;结构 磁通量调节

Principle Analysis and Implementation ofVoltage Control of Hybrid Excitation SynchronousGenerator

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Abstract:

A novel hybrid excitation synchronous generator (HESG) was developed to solve the problem that the output voltage is uncontrollable in permanentmagnet generator. The magnetic flux distribution of both the permanent magnet section and the excitation section in the HESG were computed using finite elementmethod. According to the demand for the output voltage, a control strategy for the excitation regulation system wasmade, and the operation process of this system was discussed. To verify the output voltage control capability of theHESG, a 2. 5 kW generator and its regulation circuit were designed and produced, and then tested by experimen.t The experimental results show that forno-load running, the outputvoltage of theHESGwas equal to the resultantelectric potential of the permanentmagnet section and the excitation section; and that for load running, the HESG was able to vary the gap flux tomaintain the constant terminalvoltage (135V) by adjusting the excitation current as the load increased.

Keywords: hybrid excitation synchronous generator principle structure; magnetic flux regulation

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