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高电压技术

铁心式脉冲变压器的谐振充电特性

刘毅，林福昌，冯希波，钟和清，张钦，李化，戴玲

强电磁工程与新技术国家重点实验室(华中科技大学)

摘要： 基于脉冲变压器的陡脉冲发生器是神光III能源模块主放电开关的触发方案之一。该类型触发器利用脉冲变压器对高压电容谐振充电，并通过陡化开关输出陡脉冲触发气体开关。分析杂散电阻和激磁电感对谐振充电变比和效率的影响，理论推导了环形铁心脉冲变压器的铁心体积最小值，并在实际工程中验证。设计了带载电容为1.08 nF，输出电压峰值为130 kV，绕组变比为65的干式铁心式脉冲变压器。研制了基于脉冲变压器谐振充电的气体开关触发器，其输出脉冲峰值大于120 kV，上升时间小于30 ns，能够稳定可靠地触发两电极气体开关。

关键词： 能源模块 触发器 脉冲变压器 谐振充电 输出特性

Performance of Resonant Charging Based on Pulse Transformer With a Magnetic Core

LIU Yi, LIN Fuchang, FENG Xibo, ZHONG Heqing, ZHANG Qin, LI Hua, DAI Ling

State Key Laboratory of Advanced Electromagnetic Engineering and Technology (Huazhong University of Science & Technology)

Abstract: Trigger generator based on pulse transformer is an important candidate of the trigger system for two-electrode spark gap switch in SG-III energy module. The trigger generator based on resonant charging of pulse transformer was constructed. This paper introduces the resonant charging based on magnetic core-type pulse transformer. The effects of stray resistance and magnetizing inductance on ratio and energy transmission efficiency were analyzed. The minimum volume of the magnetic core was deduced and verified in the engineering. The design and structure of a dry-type pulse transformer with a load of 1.08 nF, output voltage of more than 130 kV and winding ratio of 65 was presented. The trigger generator based on resonant charging of pulse transformer was constructed. The output impulse with peak value of more than 120 kV and rise time of less than 30ns can trigger the two-electrode spark gap switch reliably.

Keywords: energy module trigger generator pulse transformer resonant charging output characteristics

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通讯作者: 林福昌

作者简介:

作者Email: fclin@mail.hust.edu.cn

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