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一种新型直流固态功率控制器行为模型

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A Novel Behavioral Model of Solid State Power Controller

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摘要 提出一种适用于大型飞机电气系统数字仿真的直流(DC)固态功率控制器(SSPC)的行为模型.利用受控电压源控制SSPC两端电压按照线性规律变化以模拟SSPC的慢开通和慢关断特性.分析了该行为模型在稳态导通和稳态关断时的工作状态,考虑了实际直流SSPC的漏电流,对该模型进行了改进.分析该模型带各种负载的开通关断过程.在Saber软件中实现该行为模型,并通过仿真和实验验证其与各种性质负载的兼容性.快速性测试结果表明,相比基于真实结构和器件模型,该行为模型能够显著提高仿真速度和收敛性能.

关键词: 飞机电气系统 行为模型 仿真 固态功率控制器 负载兼容性

Abstract: A novel behavioral model of direct current (DC) solid state power controller (SSPC) is proposed in this paper, which is suitable for simulation of large aircraft power distribution systems. A dependent voltage source is employed in this model to achieve slow switching on and off by controlling the linearity of the voltage drop across the SSPC. Taking into consideration the leakage current, improvements are made on the SSPC behavioral model by analyzing its steady on and steady off states. Switching on and off dynamics of the proposed model with different kinds of load is studied. This model is implemented in Saber software and the compatibility for different kinds of load is validated by simulation and experimental results. Speed test results show that the proposed behavioral model is much faster and possesses better convergence property as compared with the model based on real structure and components.

Keywords: aircraft power system behavioral model simulation solid state power controller load compatibility

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