

电力电子与电力传动

高频LCC谐振变换器的分析与轨迹控制

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摘要:

LCC串并联谐振变换器兼有串联和并联谐振变换器各自的优点, 但由于LCC谐振电路有3个谐振元件, 变换器在工作中会出现出多谐振的过程, 使其分析与控制繁琐. 为研究电流连续模式下LCC串并联谐振变换器特性, 阐述变换器的工作原理, 绘出其状态轨迹图, 推导轨迹方程, 并提出一种简单、有效的轨迹控制方法. 实验结果表明, 所提状态轨迹的分析与设计方法是有效的, 而且轨迹控制能使系统能在很短的时间内达到稳态.

关键词: 串并联谐振 电流连续 状态平面分析法 轨迹方程 轨迹控制

Analysis and Trajectory Control of LCC Resonant Converter for High Frequency Applications

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Abstract:

The series-parallel resonant converter is known to have combined merits of the series resonant converter and parallel resonant converter. However, it has a three - element LCC structure with multi-resonant modes, which makes it difficult to analyze and control. In order to study the converter performance under continuous current mode, this paper demonstrated the operation principle of this converter, drew the state track diagram, and derived the trajectory equations. Finally, a simple and effective trajectory control method was given. The experimental result shows that the analysis and design method of the state-plane is effective. Trajectory control system has excellent transient performance and can achieve the new steady state in minimum time.

Keywords: series parallel resonant continuous current mode state-plane analysis trajectory equations trajectory control (TC)

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