电力系统

基于VST的电压稳定分岔分析

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摘要：

介绍了一种新颖的基于Matlab的电压稳定分岔分析工具包—电压稳定工具包(voltage stability toolbox，VST)。详述了该工具包用户友好图形接口界面和源代码开放的特点。基于数值和符号计算，该工具包采用Newton-Raphson和Newton-Raphson-Seydel 的组合算法，旨在研究电力系统中的电压稳定和分岔问题，其主要功能包括潮流计算、分岔分析、奇异性和特征根分析、动态时域仿真等。VST非常有助于理解电力系统的电压稳定和非线性分岔现象，使用该工具对一个3机5节点系统和IEEE 30节点系统进行仿真，结果验证了该工具包用于电压稳定分析的实用性和有效性。

关键词： Matlab　电压稳定分析工具包　牛顿–拉夫逊法　牛顿–拉夫逊–塞德尔法　分岔分析

A VST-Based Analysis for Voltage Bifurcation Stability

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Abstract:

A novel Matlab-based bifurcation analysis toolbox for voltage stability, named voltage stability analysis toolbox (VST), is presented. The features of its friendly graphic interface and open source are described in detail. Based on numerical and symbolic computation, a combinational algorithm integrating Newton-Raphson method and Newton-Raphson-Seydel method is adopted to research the bifurcation and voltage stability problems. Main functions of VST include power flow calculation, bifurcation analysis, singularity and eigenroot analysis, dynamic time-domain simulation and so on. VST contributes to understand power system voltage stability and nonlinear bifurcation phenomena. Simulation results of a 3-machine 5-bus system and IEEE 30-bus system verify the practicability and effectiveness of the presented toolbox in voltage stability analysis.

Keywords: Matlab　voltage stability analysis toolbox (VST)　Newton-Raphson method　Newton-Raphson-Seydel method　bifurcation analysis

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