电力系统运行与规划

概率最优潮流的点估计算法

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摘要：　针对电力市场运营中存在的不确定因素，该文提出一种基于三点估计的概率最优潮流算法。这种算法采用随机变量的高阶矩构造估计点，通过随机变量与目标函数之间的确定性关系对目标函数进行点估计，得到目标函数的统计特征值。文中所提出的算法能方便地将概率问题转化为确定性问题处理，因此可利用电力系统中已有的计算资源，提高计算效率。IEEE-30和118节点系统算例表明，和蒙特卡罗仿真及两点估计法相比，基于三点估计法的概率最优潮流分析计算量小，结果准确，得到的概率信息能更全面地反映电力市场的运行状况。

关键词：　点估计法　概率最优潮流　蒙特卡罗仿真　电力市场

Point Estimate Method for Probabilistically Optimal Power Flow Computation

PAN Wei LIU Wen-ying YANG Yi-han

Abstract: A three-point estimate method to solve the probabilistically optimal power flow for electricity market with uncertain factors was proposed in this paper. The high-order moments of stochastic variables to construct the estimate points and the certain relations between stochastic variables and objective function were utilized to determine the estimate value of objective function. By this method the probabilistic problems can be handled with the same routines as those corresponding to deterministic problems while alleviating the computational burden. Numerical results of IEEE 30-bus and 118-bus systems show that comparing with Monte Carlo simulation and two-point estimate method, the three-point estimate method provides better performance in dealing with probabilistic optimal power problems. Probabilistic information obtained by this method is helpful to reveal the actual status in electricity market.

Keywords: point estimate method　probabilistically optimal power flow　Monte Carlo simulation　electricity market

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