电网技术 2006 30 (24): 68-72 ISSN: 1000-3673 CN: 11-2410/TM

动态状态估计中PMU配置的离散粒子群优化算法

黄姝雅，刘天琪，陈 绩

四川大学 电气信息学院，四川省 成都市 610065

收稿日期 修回日期 网络版发布日期 接受日期

摘要
以提高动态状态估计精度为目标，采用离散粒子群优化(discrete particle swarm optimization，DPSO)算法对同步相量测量单元(phsor measurement unit，PMU)的配置点进行优化。该方法克服了传统解析优化方法难以适应不连续目标函数和不连通约束域等情况的缺点，同时，在配置有限PMU的情况下使PMU量测量发挥最大效益。最后对基于扩展Kalman滤波算法的动态状态估计模型进行仿真，证明了经DPSO优化后的配置与随机配置相比最大可能地利用了PMU的高精度量测信息，充分发挥了PMU量测的优点，大大提高了动态状态估计的精度。

关键词 相量测量单元(PMU)；动态状态估计；离散粒子群优化算法；配置；电力系统

分类号 TM734

Discrete Particle Swarm Optimization Algorithm for Phasor Measurement Unit Placement in Dynamic State Estimation

HUANG Shu-ya，LIU Tian-qi，CHEN Ji

School of Electrical Engineering and Information，Sichuan University，Chengdu 610065，Sichuan Province，China

Abstract
To improve the accuracy of dynamic state estimation, the discrete particle swarm optimization (DPSO) algorithm is adopted to optimize the placement of phasor measurement unit (PMU). This method can overcome the defects of traditional analytical optimization methods: they are hard to suit the conditions of discontinuous objective function and disconnected constrained domain. At the same time, the quantities measured by PMU can fully give play to maximum advantage while limited PMUs are placed. The dynamic state estimation model based on extended Kalman filter theory is simulated. It is proved by simulation results that comparing with random placement of PMU, the proposed PMU placement optimized by DPSO can utilize the measurement information with high accuracy as much as possible and the advantage of measurement by PMU can be fully developed, thus the accuracy of dynamic state estimation can be evidently improved.

Key words phasor measurement unit(PMU)；dynamic state estimation；discrete particle swarm optimization algorithm；placement；power system

DOI:

通讯作者

作者个人主页 黄姝雅;刘天琪;陈 绩