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改进混沌PSO算法的电力系统最优潮流计算

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摘要 电力工业的市场化改革对最优潮流（Optimal Power Flow，OPF）的计算精度和速度提出了更高的要求。在分析最优潮流理论及其算法的基础上，对比一些经典解算法，引入粒子群优化算法（PSO）来计算发电厂成本耗费问题。考虑到传统PSO算法处理OPF约束条件时，对随机粒子个体的质量和速度的选取不能保证，且收敛速度慢，并容易陷入局部最优解，提出改进的混沌粒子群算法，即利用混沌运动特性来改进粒子群算法。利用该算法与其他算法对IEEE5节点算例进行分析比较，结果表明改进的混沌微粒群优化算法可较好处理最优潮流约束条件，有效提高了PSO算法的全局收敛能力和计算精度。在处理最优潮流问题上具有一定的有效性和优越性。

关键词 最优潮流 粒子群优化算法 混沌 收敛 局部最优 最优化

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Improved chaos PSO algorithm for optimal power flow calculation system

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Abstract

The market revolution of the power industry presents higher requirement for the computing precision and speed of Optimal Power Flow（OPF）.Contrasting to some of the classical algorithm in the past，it introduces the Particle Swarm Optimization（PSO） to deal with the fuel cost of the generating company in the analysis of optimal power flow theory and on the basis of the algorithm.But when taken into account the traditional PSO algorithm processing OPF restrictive conditions，the random particles can not guarantee the quality of the individual and the choice of its rate，and the convergence rate of the particle can be slow，in addition，it is so easy to fall into the local optimal solution that can not be recognized by people，so the improved chaotic particle swarm algorithm is presented.It makes use of the characteristic of chaos to improve the basic particle swarm optimization.This paper compares the chaotic particle swarm algorithm with the other nonlinear inequality constraints optimal algorithm analysis by testing with computer.The results of the example— —the standard IEEE 5—bus system model showes that the improved chaos particle swarm optimization algorithm can be better dealt with optimal power flow constraints in dealing with the issue of optimal power flow.This method can also find preferable results and its correctness and validity is proven by a series of tests and computations，and that the algorithms can be widely applied to the areas of power system planning and operation.

Key words optimal power flow particle swarm optimization chaotic convergence the local optimal optimization

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