

电力系统运行与规划

智能工程理论扩展及其在电网规划中的应用

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摘要: 智能工程(intelligent engineering, IE)是将一般智能方法综合的理论, 目前已发展了智能路径、智能空间及a-优越解几个重要概念。市场机制下输电规划问题是研究的难点, 任何单一的输电规划方法都无法解决含多个目标的电网规划问题, 智能工程为之提出了解决思路。该文在将智能工程应用于输电系统规划问题中, 指出智能工程对于市场机制下含多个目标的输电规划是适用的。根据规划需求将智能工程理论进行扩展, 提出智能优化论, 定义a-优化解的概念, 提出最优解定理和a-优化解定理; 提出智能工程代数学, 给出a-优越解的表述及解法, 定义两类智能算子并给出其运算性质。最后通过IEEE-30节点算例验证该方法的有效性。

关键词: 智能工程 电网规划 智能优化论 a-优化解 智能算子

Intelligent Engineering Theory Expanding and Its Application in Transmission Planning

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Abstract: The intelligent engineering (IE) is a theory system which integrates general intelligent methods. It has developed some important concepts, such as intelligent path, intelligent space and a-advantaged solution. Transmission planning is difficult job under electricity market environment. The question of transmission planning, which has multi- objectives, can not be figured out by any single method. The IE is a promising tool to resolve the difficulty. The paper introduced the intelligent engineering applied in transmission planning and pointed out that the IE is very suitable to figure out the transmission planning problem and IE theories were expanded accordingly. It proposed the intelligent optimization theory, the concept of a-optimized solution, the theory of optimization result, a-optimized solution and their applications. The IE algebra was also proposed, which includes the expression and solution of a-optimized solution as well as two intelligent operators and their operation quality. Simulation of IEEE 30-bus power system demonstrated the validity of the proposed method.

Keywords: intelligent engineering transmission planning intelligent optimized theory a-optimized solution intelligent operator

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