

电力系统

采用改进隶属度函数的梯级水电站多目标优化调度模型

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摘要:

梯级水电站的多目标优化调度要求在保证发电量最大同时减少用水量和弃水量, 提高水能利用率, 为此提出了采用改进隶属度函数的梯级水电站模糊多目标优化调度模型, 以梯级水电站总发电量最大、总弃水量最小及调度期末蓄水量最大为目标建立了多目标优化调度模型。传统求解多目标问题的模糊算法普遍采用半升或半降直线型隶属度函数, 文中以定义域上连续可微的Sigmoid函数及反Sigmoid函数作为新的隶属度函数, 确定了Sigmoid隶属度函数各参数的计算方法。改进隶属度函数的应用要求目标函数可导的非线性规划法更加适于求解该多目标模型。算例结果验证了该模型的可行性。

关键词:

Multi-Objective Optimal Scheduling for Cascaded Hydroelectric Power Plant Based on Improved Membership Functions

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Abstract:

It is demanded for multi-objective optimal dispatching for cascaded hydropower stations to ensure as high electric energy production as possible and to reduce water consumption and water to be abandoned to improve waterpower utilization. For this reason, an optimized fuzzy multi-objective dispatching model adopting improved membership function is proposed, in which the maximum gross power generation, the maximum total abandoned water and the maximum water storage at the end of the dispatching period are taken as objective functions, for cascaded hydropower stations. In the solution of multi-objective problem by traditional fuzzy algorithms, the increasing or decreasing linear membership functions are commonly used. In this paper, the continuously differentiable Sigmoid function and inverse Sigmoid function are taken as new membership functions, then a method to calculate parameters of Sigmoid membership functions is determined. Because of applying improved membership functions, those nonlinear programming methods are suitable to solve this multi-objective dispatching model. The feasibility of the proposed model is verified by results of calculation example.

Keywords:

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