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基于模糊机会约束规划的水火电力系统多目标随机调度模型

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摘要：

针对水火电力系统运行调度中所包含的不同种类的不确定量，提出了一种基于模糊随机机会约束规划的短期水火电力系统多目标优化调度模型。将调度周期开始的水库蓄水量作为一个三角模糊量，以描述初始蓄水预测可能存在的误差。针对某些随机变量可能由于历史数据不足而存在误差的问题，用模糊随机变量替代这些随机变量，描述水火电力系统运行中的不确定性。在考虑整个系统发电煤耗最小化和污染物排放最小化的目标同时，考虑了龙头电站周期末蓄水量最大的优化目标，并引入了火电机组煤耗量与梯级水电站蓄水量目标的协调函数。按照模糊机会约束和随机机会约束的确定性等价形式，将短期水火电调度不确定模型转化为确定性模型。以一个8级梯级水电站和6台火电机组组成的水火电力系统为实例进行计算，验证了所提出的水火电力系统随机调度模型的正确性。

关键词： 水火电力系统　随机调度　模糊机会约束规划　随机变量

Multi-objective Stochastic Scheduling Models for Hydrothermal Plants Based on Fuzzy Chance Constrained Programming

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Abstract:

A stochastic scheduling model for hydrothermal power systems is presented based on fuzzy chance constrained programming, taking reservoir inflow and water level for a random variable. Reservoir water volume at the initial hour was formulated as a triangular fuzzy number, representing forecasting errors of reservoir water level. Aiming to represent stochastic variable characteristics due to historical data errors, fuzzy stochastic variables were used to represent the uncertainties incurred in optimization scheduling of hydrothermal power systems. A control function was introduced to coordinate the three objective functions, which includes coal consumption minimization, reservoir water level maximization and air pollutant emission minimization. A stochastic scheduling model of hydrothermal power systems can be converted into a determined form using fuzzy chance constrained programming and random chance constrained programming. A system with 8 cascaded plants and 6 coal-fired plants was taken as a study example and the results show that the model is correct.

Keywords: hydrothermal power system　stochastic scheduling　fuzzy chance constrained programming　stochastic variable

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