



"Gheorghe Asachi" Technical University of Iasi, Romania



DEVELOPMENT OF A FUZZY-MARKOV-BASED INTERVAL STOCHASTIC DYNAMIC PROGRAMMING MODEL FOR RESERVOIR OPERATION MANAGEMENT

Dianzheng Fu, Yongping Li*, Guohe Huang, Ying Zhu

*MOE Key Laboratory of Regional Energy Systems Optimization, Sino-Canada Resources and Environmental Research Academy,
North China Electric Power University, Beijing 102206, China*

Abstract

In this study, a fuzzy-Markov-based interval stochastic dynamic (FM-ISDP) analysis method is developed for reservoir operation management (ROM). In ROM, uncertainties could be represented as discrete intervals, fuzzy sets, and fuzzy-stochastic forms. FM-ISDP is framed on the integration of interval analysis, fuzzy vertex analysis, stochastic dynamic optimization approaches and the fuzzy-Markov chain. The developed model is applied to a case of ROM within a multi-user, multi-uncertainty and multistage context. The results indicate that reasonable solutions can be generated, helping the authority identify desired water release policies and water allocation patterns. Besides, through comparing with the conventional interval stochastic dynamic method, the results also interpret parameters' vagueness is an imperative factor which has a significant effect on the total system benefit.

Key words: decision making, fuzzy Markov chain, multiple uncertainties, reservoir operation management, stochastic dynamic programming

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* Author to whom all correspondence should be addressed: e-mail: yongping.li@iseis.org; Phone: +86 10 5197 1255; Fax: +86 10 5197 1284