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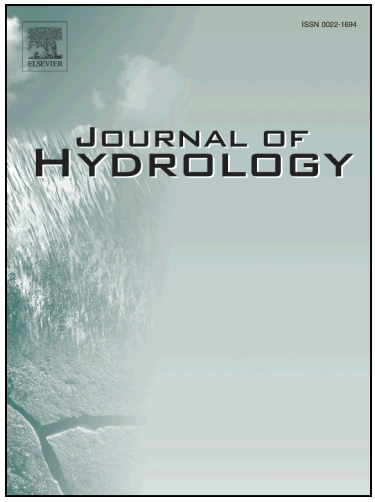

Research papers

Water level management of lakes connected to regulated rivers: an integrated modeling and analytical methodology

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ACCEPTED MANUSCRIPT

Water level management of lakes connected to regulated rivers: an integrated modeling and analytical methodology

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Abstract: Reservoir operations significantly alter the hydrological regime of the downstream river and river-connected lake, which has far-reaching impacts on the lake ecosystem. To facilitate the management of lakes connected to regulated rivers, the following information must be provided: (1) the response of lake water levels to reservoir operation schedules in the near future and (2) the importance of different rivers in terms of affecting the water levels in different lake regions of interest. We develop an integrated modeling and analytical methodology for the water level management of such lakes. The data-driven method is used to model the lake level as it has the potential of producing quick and accurate predictions. A new genetic algorithm-based synchronized search is proposed to optimize input variable time lags and data-driven model parameters simultaneously. The methodology also involves the orthogonal design and range analysis for extracting the influence of an individual river from that of all the rivers. The integrated methodology is applied to the second largest freshwater lake in China, the Dongting Lake. The results show that: (1) the antecedent lake levels are of

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