Geophysical Research Abstracts
Vol. 20, EGU2018-3053, 2018
EGU General Assembly 2018

Derivation of flood storage allocation for a multi-reservoir system

Xiaoqi Zhang (1), Pan Liu (2), and Chong-Yu Xu (3)

(1) State Key Laboratory of Water Resources and Hydropower Engineering Science, Wuhan University, Wuhan, China (zhangxq0225@whu.edu.cn), (2) State Key Laboratory of Water Resources and Hydropower Engineering Science, Wuhan University, Wuhan, China (liupan@whu.edu.cn), (3) Department of Geosciences, University of Oslo, Oslo, Norway (c.y.xu@geo.uio.no)

Abstract:
The flood storage allocation is an important issue for reservoirs in series or in parallels. However, the optimal flood storage allocation scheme is usually derived by establishing an optimization model, which needs to be solved via a complex optimal algorithm. In this study, the energy function, namely E-function, is put forward to describe the object of hydropower generation. Then, the E-function can be represented as the function of two variables in a multi-reservoir system (no matter reservoirs in series or in parallels), i.e. the proportional coefficient (alpha, which represents the proportional relationship between two reservoirs in the multi-reservoir system) and the total increment of the flood storage. Finally, the alpha-discriminant deduced from the E-function for a multi-reservoir system can be used to infer the optimal storage allocation scheme, where the maximum hydropower generation can be acquired. With Ankang-Danjiangkou Reservoirs as a case study, the E-function and the alpha-discriminant are compared with the conventional hydropower generation operating. The results indicate that (1) the E-function can be used to evaluate the total hydropower generation during the flood season for a multi-reservoir system, because the evaluation errors of the hydropower generation between the E-function and the conventional hydropower generation operating are acceptable, and (2) the optimal storage allocation scheme can be explicitly obtained by using the alpha-discriminant. These findings are helpful to understand the allocation of flood storages among a multi-reservoir system.

Key words: Flood storage allocation; a multi-reservoir system; energy function; alpha-discriminant.