Development of Flood Control Effect Index by Using Fuzzy Set Theory

Changwon Choi¹, Jaeeung Yi¹ and Ju-uk Kim¹ ¹Department of Civil & Transportation Engineering, Ajou University, South Korea

Quantitative evaluation indexes for flood control effect of a reservoir used widely in Korea are the discharge control rate, reservoir release rate, reservoir storage rate, and flood control storage utilization rate. These indexes usually use and compare inflow, release, and storage data. The uncertainty included in these data is not considered in evaluation process, and the downstream flood control effects are not assessed properly. Also, since the acceptable partial failure in a design of water resources system is not considered, the development of a new flood control effect index is required. Fuzzy Set Theory is applied to the development of flood control effect, and the acceptable partial failure. The developed index is applied to the Chungju reservoir basin located in Korea. The storm events of 2006 are used to study the applicability of the developed index. The results show that the developed index can represent the flood control effect of a reservoir more realistically and objectively.

Keywords: Flood control effect index; Fuzzy Set Theory; Acceptable partial failure; Downstream flood control