

Development of Dam Inflow Simulation Method Based on Bayesian Autoregressive Exogenous Stochastic Volatility (ARXSV) model

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Abstract

The prediction of dam inflow rate is crucial for the management of the largest multi-purpose dam in South Korea, the Soyang Dam. The main issue associated with the management of water resources is the stochastic nature of the reservoir inflow leading to an increase in uncertainty associated with the inflow prediction. The Autoregressive (AR) model is commonly used to provide the simulation and forecast of hydrometeorological data. However, because its estimation is based solely on the time-series data, it has the disadvantage of being unable to account for external variables such as climate information. This study proposes the use of the Autoregressive Exogenous Stochastic Volatility (ARXSV) model within a Bayesian modeling framework for increased predictability of the monthly dam inflow by addressing the exogenous and stochastic factors. This study analyzes 45 years of hydrological input data of the Soyang Dam from the year 1974 to 2019. The result of this study will be beneficial to strengthen the potential use of data-driven models for accurate inflow predictions and better reservoir management.

Keywords : Autoregressive model, ARX model, Bayesian, Soyang Dam, Stochastic Volatility

Acknowledgment

This study is supported by a Korea Environmental Industry & Technology Institute (KEITI) grant funded by the Ministry of Environment.

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