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An Entropy-based Method for Monthly Streamflow Forecasting

Huijuan Cui (1) and Vijay Singh (2)

(1) Chinese Academy of Sciences, Beijing, China(cuihj@igsnrr.ac.cn), (2) Texas A&M University, College Station, USA(vsingh@tamu.edu)

Time series models are most widely used for long-term streamflow forecasting. As monthly streamflow possess strong seasonal pattern, for which, seasonal or periodic time series models are often used. It is critical to detect correct periodicity from monthly streamflow data to forecast with higher accuracy. Therefore, streamflow forecasting entails modeling two main aspects: seasonality and correlation structure. Spectral analysis can be employed to characterize patterns of streamflow variation and identify the periodicity of streamflow. That is, it permits to extract significant information for understanding the streamflow process and prediction thereof. To determine streamflow spectra, entropy theory can be applied, in which time series analysis is combined with spectral analysis. Entropy as a measure of uncertainty has become an efficient tool for hydrologic modeling. This study will introduce a seasonal streamflow forecasting method based on entropy spectral analysis and show how entropy will benefit monthly streamflow forecasting. Application of entropy theory for streamflow forecasting involves the determination of spectral density, determination of parameters, and extension of the autocorrelation function. This study introduces two approaches for applying entropy theory through either maximizing or minimizing entropy to monthly streamflow forecasting and verified results using observed streamflow data.