

Prediction of Flow Duration Curves for Ungauged Basins with Quasi-Newton Method

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ABSTRACT

Prediction of flow-duration-curves (FDC) is an important task for water resources planning, management and hydraulic energy production. Classification of the basins as carstic and non-carstic may be used to estimate parameters of the FDC with predictive tools for catchments with/without observed stream flow. There is a need for obtaining FDC for ungauged stations for efficient water resource planning. Thus, study proposes a quite new approach, called the EREFDC model, for estimating the parameters of the FDC for which the parameters of the FDC are obtained with quasi-Newton method. Estimation are made for using the by gauged stations at first than the FDC parameters are estimated for ungauged stations based on drainage area, annual mean precipitation, mean permeability, mean slope, latitude, longitude, and elevation from the mean sea level are used. The EREFDC model consists of various type of linear- and nonlinear mathematical equations, is able to predict a wide range of the FDC parameters for gauged and ungauged basins. The method is applied to 72 unimpaired catchments studied are about for 50 years average daily measured stream flow. Results showed that the EREFDC model may be used for estimating. FDC parameters for ungauged hydrological basins in order to find FDC for ungauged stations. Results also showed that the EREFDC model performs better in carstic regions than non-carstic regions. In addition, parameters of FDC for tributaries at the basins with insufficient flow data or without flow data may be determined by using basin characteristics.

KEYWORDS

Flow Duration Curve; Optimization; BFGS Algorithm; Basin Characteristics

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