The Karkheh River Streamflow Forecast Based on the Modelling of Time Series

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Abstract

Autoregressive integrated moving average (ARIMA) models are appropriate for the annual streamflows (annual peak and maximum and also mean discharges) of the Karkheh River at Jelogir Majin station of Karkheh river basin in Khuzestan province in western Iran, through the Box- Jenkins time series modelling approach. In this research among the suggested models interpreted from ACF and PACF, ARIMA(4,1,1) for all annual streamflows satisfied all tests and showed the best performance. The model forecasted streamflow for ten leading years showed the ability of the model to forecast statistical properties of the streamflow in short time in future. The SAS and SPSS softwares were used to implement of the models.

Key words: Hydrologic Time Series, Box-Jenkins Approach, ARIMA Model, Karkheh River

1. Introduction

The application of statistical hydrology in earlier days was restricted to surface water problems, especially for analyzing the hydrologic extremes such as floods and droughts. However, during past three decades, the statistical domain of hydrology with the advent of fast computing technology has broadened to encompass the problems of both surface water and groundwater systems. With such a broad domain, statistics has emerged as a powerful tool for analyzing hydrologic time series. The Box-Jenkins ARIMA model is the most commonly time series model in hydrologic time series modelling [1]. The ARIMA model has two general forms: ARIMA(p,d,q) and multiplicative ARIMA(p,d,q)×(P,D,Q) in which p and q are non-seasonal autoregressive and moving average, P and Q are seasonal