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PWMs<sup>1</sup>

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$$B_r = E[x[F(x)^r]] \quad ( )$$

$$\int_0^{\infty} x^2 (cdf)^r F(x) dx$$

$$\mu_x = \int_0^{\infty} x \beta_0 F(x) dx \quad r=0$$

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PWMs

PWMs

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$$b_0 = m = \frac{1}{n} \sum_{j=1}^n x(j) \quad ( )$$

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Hosking

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Hosking (1990) L  $\lambda$   $C_v = \frac{\delta}{\mu}$

: L (L-CV)  $(\ )$   
 $\tau_2 = \frac{\lambda_2}{\lambda_1}$   $(\ )$

$\tau_3 = \frac{\lambda_3}{\lambda_2}$  (L-Skew ness)  $(\ )$

$\tau_4 = \frac{\lambda_4}{\lambda_2}$  (L-Kurtosis)  $(\ )$

L  $, \lambda_r = 1, \dots, 4$   
 (L-CV)L  $\tau_4, \tau_3, \tau_2$   
 L L L  
 $(\mu)$   
 $(\ )$

$$b_1 = \sum_{j=1}^{n-1} \left[ \frac{n-j}{n(n-1)} \right] x(j) \quad ( )$$

$$b_2 = \sum_{j=1}^{n-2} \left[ \frac{(n-j)(n-j-1)}{n(n-1)(n-2)} \right] x(j) \quad ( )$$

$$b_3 = \sum_{j=1}^{n-3} \left[ \frac{(n-j)(n-j-1)(n-j-2)}{n(n-1)(n-2)(n-3)} \right] x(j) \quad ( )$$

$x_{(1)}$   $x_{(n)}$   $x(j)$

PWMs

$$b_r = \frac{1}{n} \sum \left[ \frac{\binom{n-j}{r}}{\binom{n-1}{r}} \right] x(j) \quad ( )$$

: PWMs

$$\lambda_1 = \beta_0 \quad ( )$$

$$\lambda_2 = 2\beta_1 - \beta_0 \quad ( )$$

$$\lambda_3 = 6\beta_2 - 6\beta_1 + \beta_0 \quad ( )$$

$$\lambda_4 = 20\beta_3 - 30\beta_2 + 12\beta_1 - \beta_0 \quad ( )$$

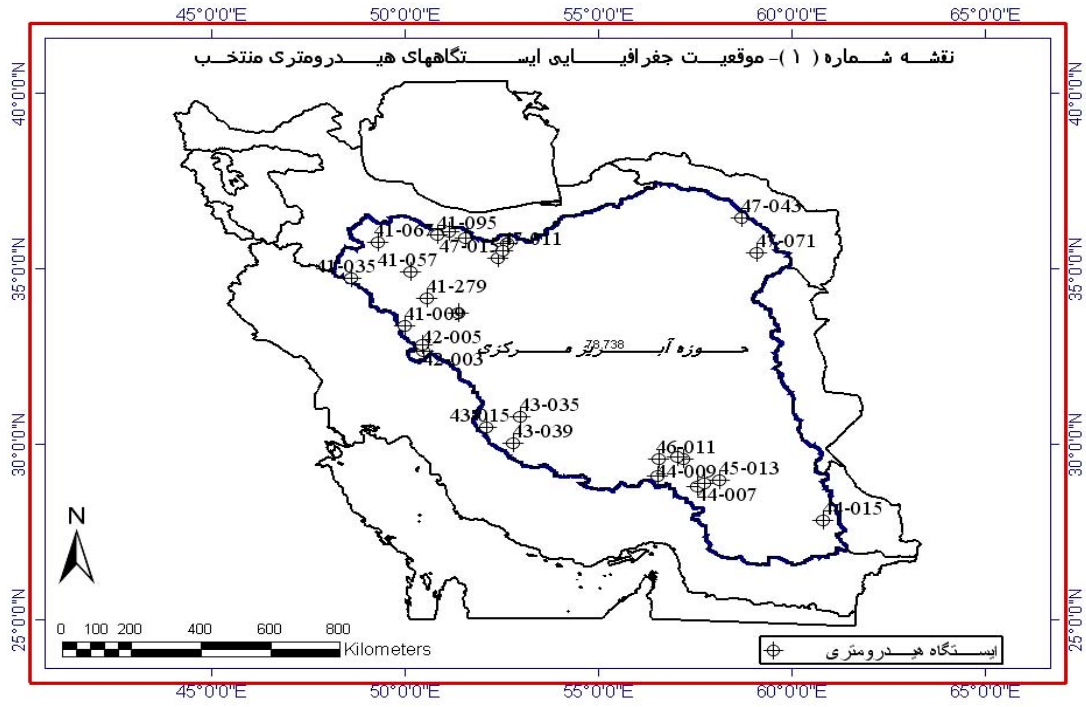
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$$\begin{pmatrix} (\ ) \\ (\ ) (\ ) \\ (\ ) (\ ) \end{pmatrix} \quad b_r \quad L$$

:

$$\lambda_{r+1} = \sum \beta_r (-1)^{r-k} \binom{r}{k} \binom{r+k}{k} \quad ( )$$

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R.S.S

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$$R.S.S = \left[ \frac{\sum_{j=1}^n (Q_e - Q_o)^2}{n - m} \right]^{1/2} \quad ( )$$

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: $Q_e$

: $Q_o$

:n

:m

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Hyfa

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R.S.S

R.S.S

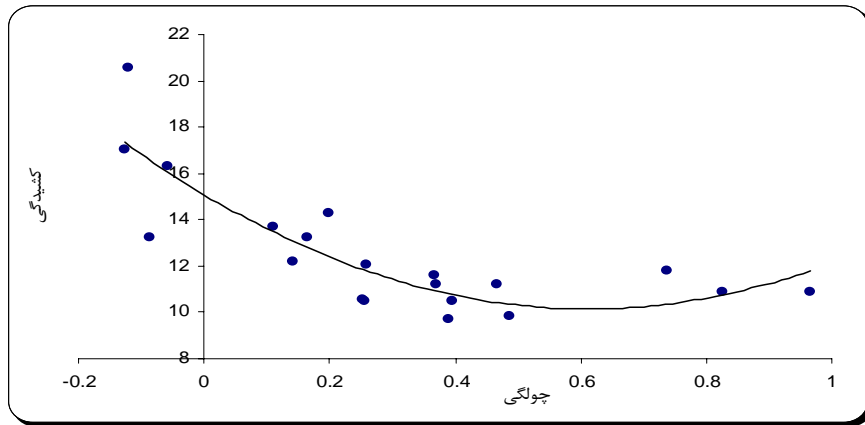
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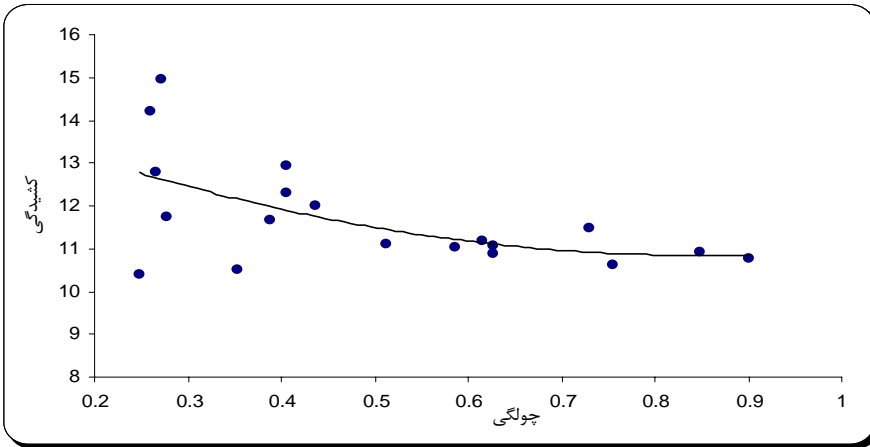
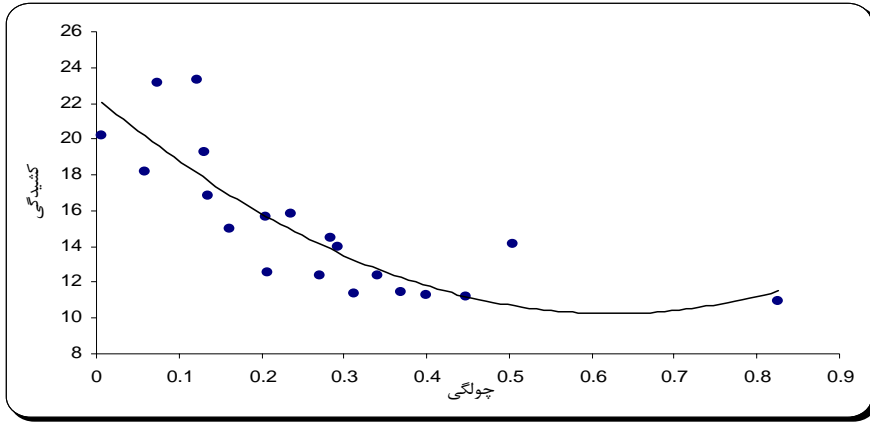
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Residual Sum of Squares

Hydrological Frequency Analysis





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## A Study of the Appropriate Probability Distributions for Annual Flow Series, Using L-Moment Method in Arid and Semi-arid Regions

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### Abstract

Different methods are employed in application of probability distribution in hydrology. The most common among these methods is the Central Moment Method. Maximum Likelihood Method is applied where computers are available and employed. In this study it has been tried to make a comparison between L-moment applicability and applicability of the other methods. To determine the probability distribution parameters and suitable distribution for annual discharge series, with an application of L-moment Method, 20 hydrometric stations were chosen for minimum, mean and maximum annual discharges. A number of 17 stations were picked up for maximum peak (flood) discharges. Results obtained for the study area in the central plateau watershed indicate the most fitting way of evaluation for different annual discharges as follows: Minimum discharges:  $P_3$  (third kind Pearson distribution), and L moment method. Medium annual discharges:  $P_3$  &  $LP_3$  (Log Pearson of third kind), and L moment method. Maximum annual discharges:  $P_3$  distribution & L moment method, and also  $LP_3$  distribution and two parameter LN ( $LN_2$ ) & normal moment method. Maximum annual momentous discharges:  $LP_3$  distribution & normal moment method, as well as the three:  $P_3$ , three parameter LN ( $LN_3$ ) and two parameter LN ( $LN_2$ ) distributions.

**Keywords:** Linear moment, Maximum likelihood, Ordinary moment, Residual Sum of Squares, Discharge, Frequency Distribution Function.

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