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“HYSEP”

Separation of Main Components of Zayandehrud River Flow and It's Uses

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Abstract

The Zayandehrud river total flow is composed of two main components, i.e. total base flow and direct runoff. The former component includes secondary components resulted from groundwater discharge, overland flow produced by slow melting of snow and delayed interflow. The later component (the direct runoff), consists of secondary components of surface runoff from precipitation, overland flow produced by prompt snow melting and rapid interflow. The separation of main components of total stream flow has been performed by "HYSEP" model on the basis of daily stream flow data. This software employs three methods (fixed interval, sliding interval and local minimum) to compute values of above-mentioned main components. Since the flood intensity related to maximum value of direct runoff and drought intensity related to minimum value of total base flow, both can be analyzed for different return period using Zayandehrud stream flow long term data. On the basis of obtained results, a flood with total stream flow equal or exceed to 161.05 cms and direct runoff equal or exceed to 96.28 cms arise every 196 years. On the other hand, a drought with total stream flow less than or equal to 16.09 cms and total base flow less than or equal to 13.83 cms occur every 16 years.

Keywords: Zayandehrud, Hydrograph separation, Direct runoff, Total base flow.

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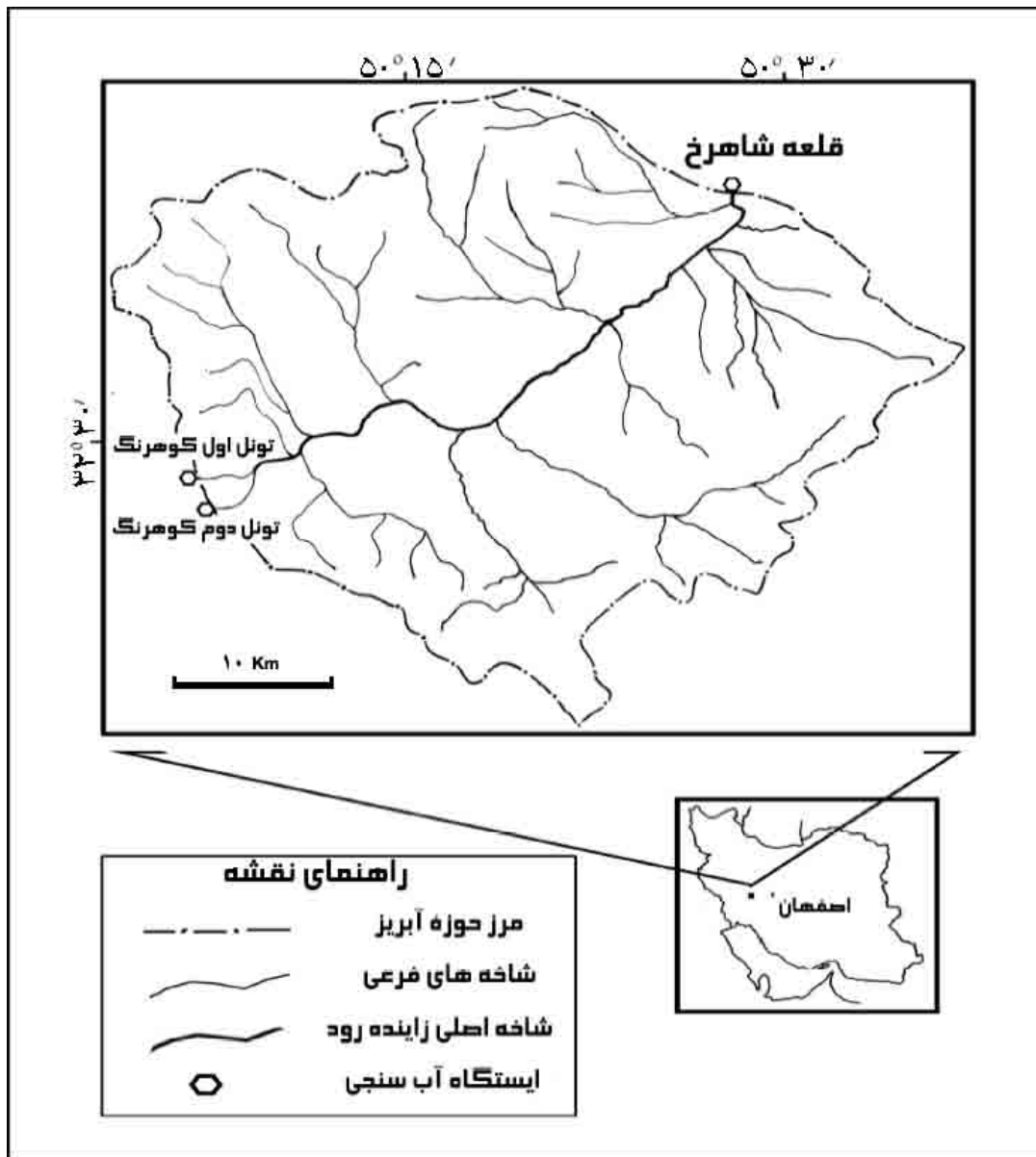
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(Surface

(
runoff)

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(Interflow)

(Subsurface flow)

(Slow Snowmelt)

(prompt

snowmelt)

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(Bank storage)

(Prompt interflow)

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(Delayed interflow)

(Groundwater discharge)

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(Channel

(precipitation)

(Groundwater

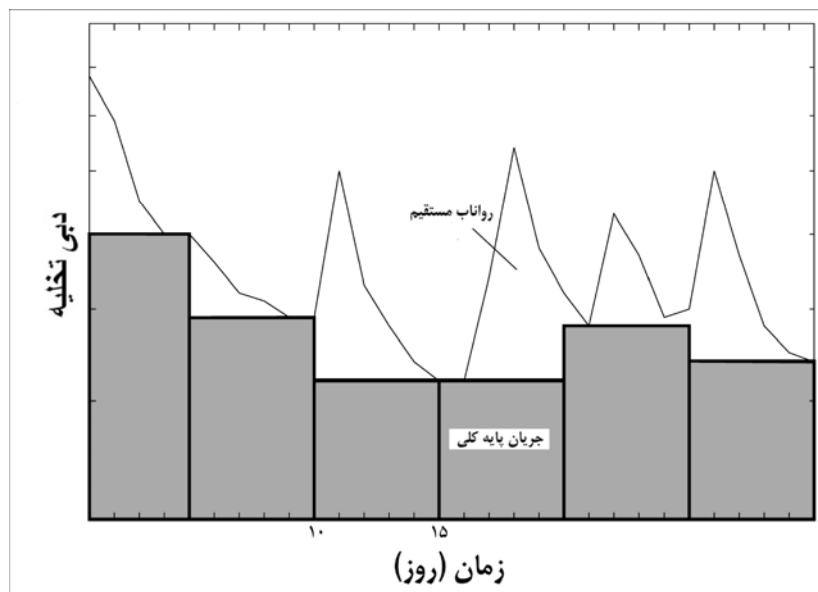
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recession)

(Snowmelt

(flow)

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(



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2N*

. []

(N)

: []

(Total base flow)

(Baseflow)

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0.2
N = A

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= N

= A

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(Direct runoff)

2N

2N*

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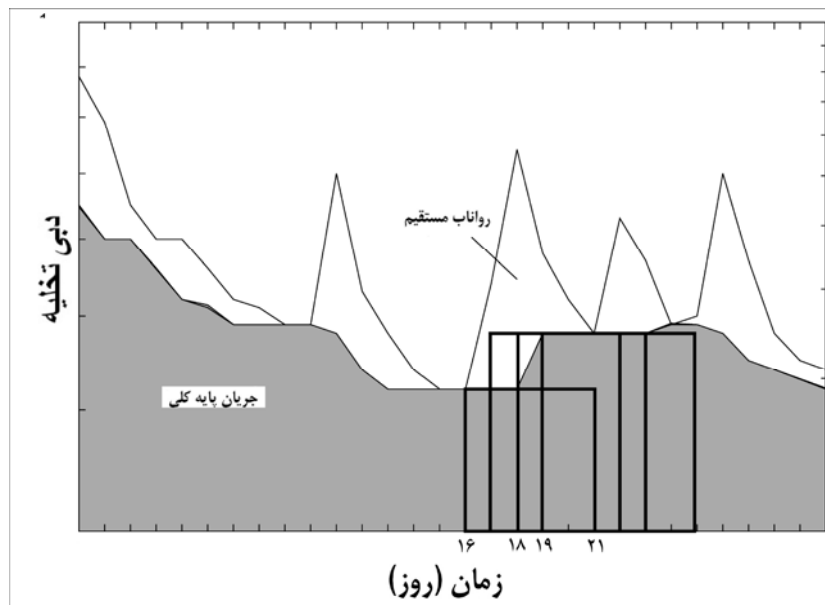
2N*

2N*

(2N*)

(Fixed-Interval

(Method)



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Archiv

Method)

(Sliding-Interval

(Local-Minimum

(Method)

[0.5(2N*-1)]

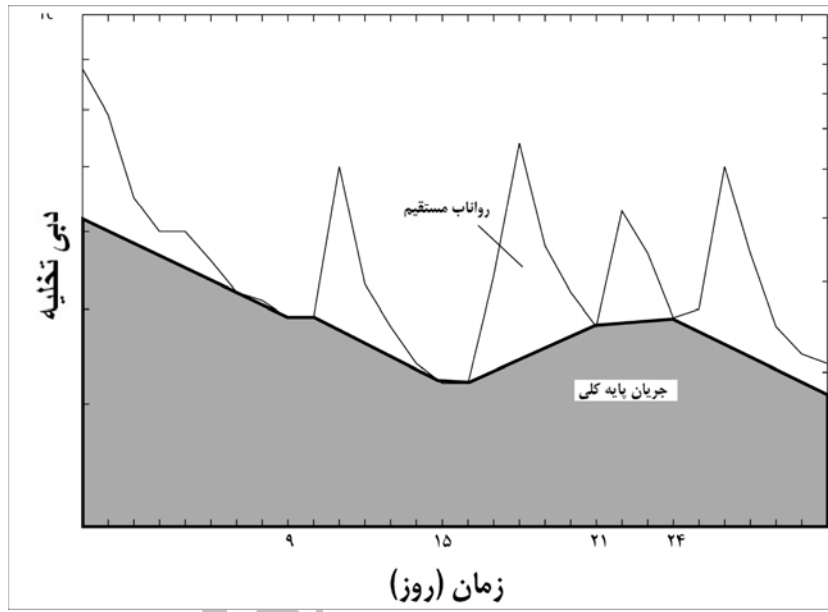
2N*

...

(2N*)

[0.5(2N*-

1)]



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(Hydrograph " HYSEP "

" FORTRAN 77 "

Separation)

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(French Creek)

"WATSTORE" (Standard U.S.G.S
National Water Data Storage & Retrieval System)

$$P = \frac{m}{(n+1)} = \frac{1}{T}$$

[]

"ASCII"

$$() = P$$

$$\text{(Order number)} = m$$

$$= N$$

$$= T$$

(Flow duration)

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$$P = \frac{m}{n} = \frac{1}{T}$$

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(Cumulative

distribution function)

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(Frequency curve)

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HYSEP

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("RORA"

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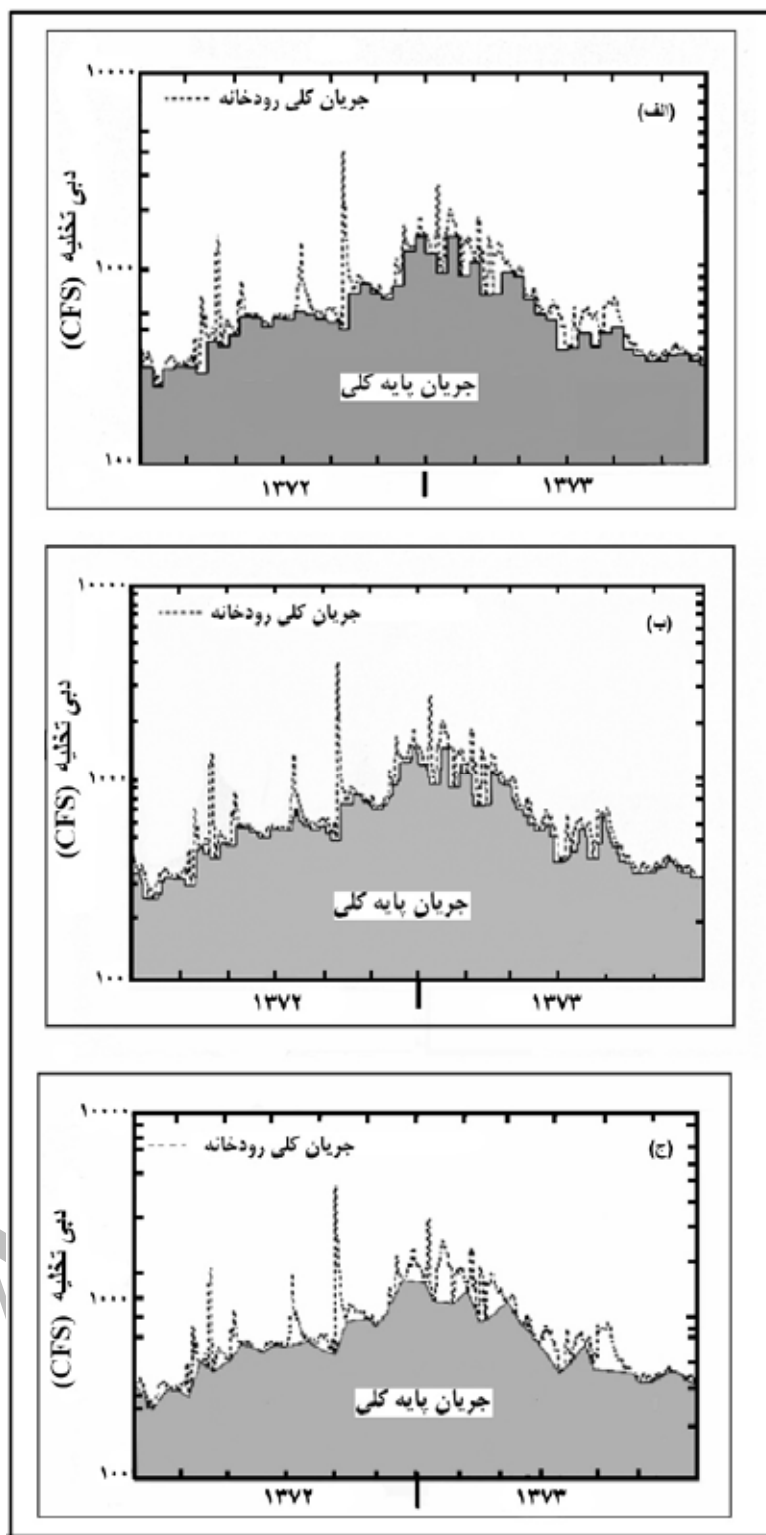
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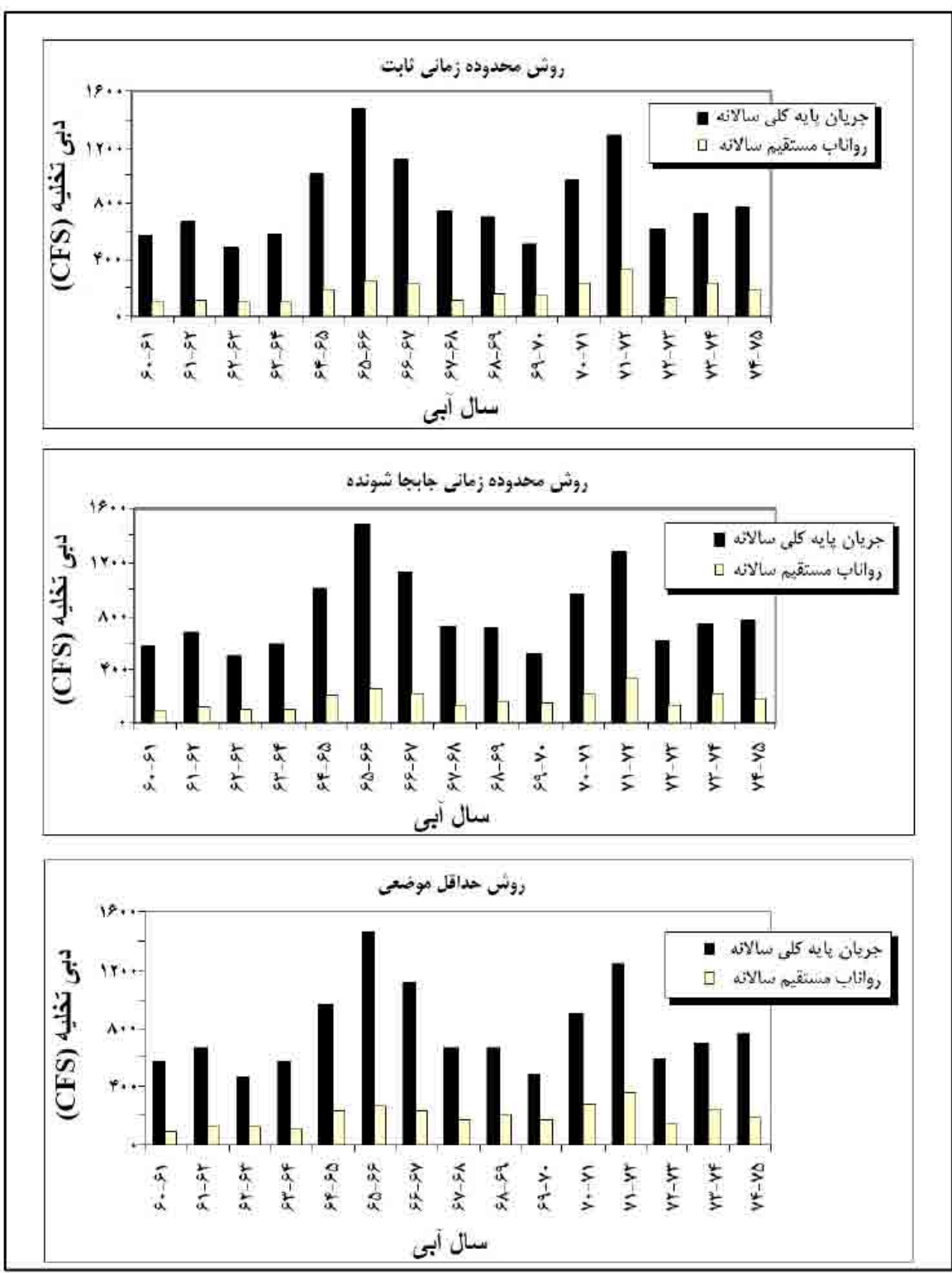


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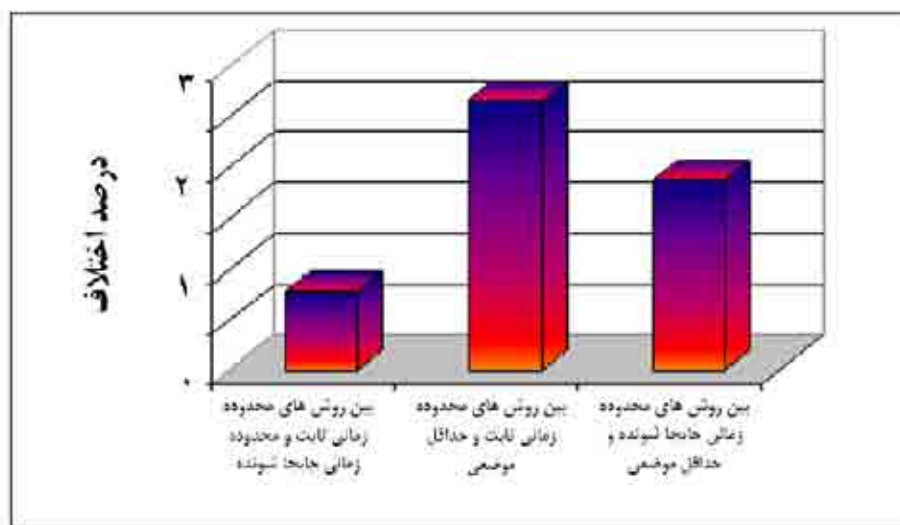
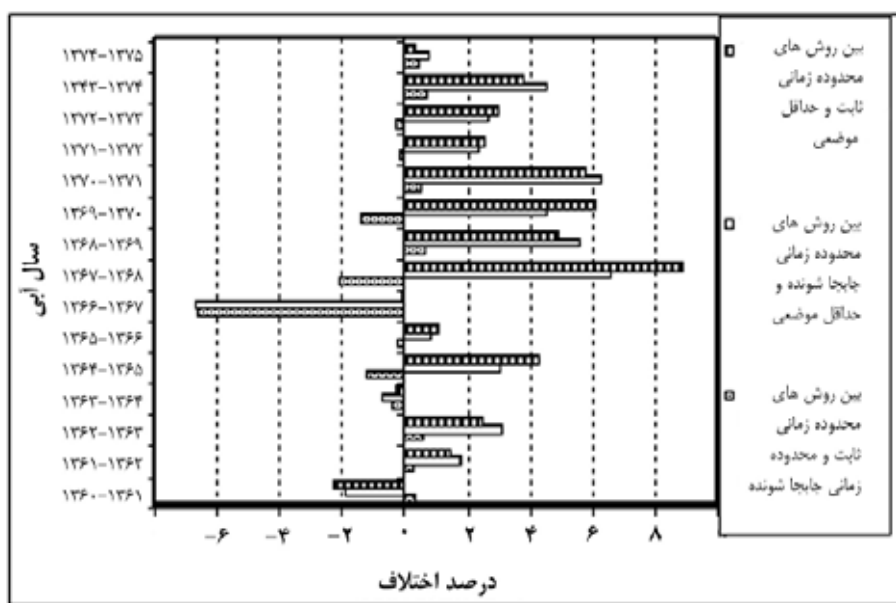
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$$\left(\frac{\text{ft}^3/\text{s}}{\text{s}} \right) = \text{m}^3/\text{s} :$$



$(ft^3/s * / = m^3/s :)$



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: []

) v

$$V = \frac{Q.K}{2.3026}$$

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$$K (\quad)$$

Q

:[]

(t_c)

$$t_c = 0.2144K$$

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.[]

Q₂

.[]

(K)

Q₁

.[]

$$R = \frac{2(Q_2 - Q_1)K}{2.3026}$$

:

$$(\quad) = R$$

$$= Q_1$$

$$= Q_2$$

$$= K$$

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(

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.()

Q_1

(K)

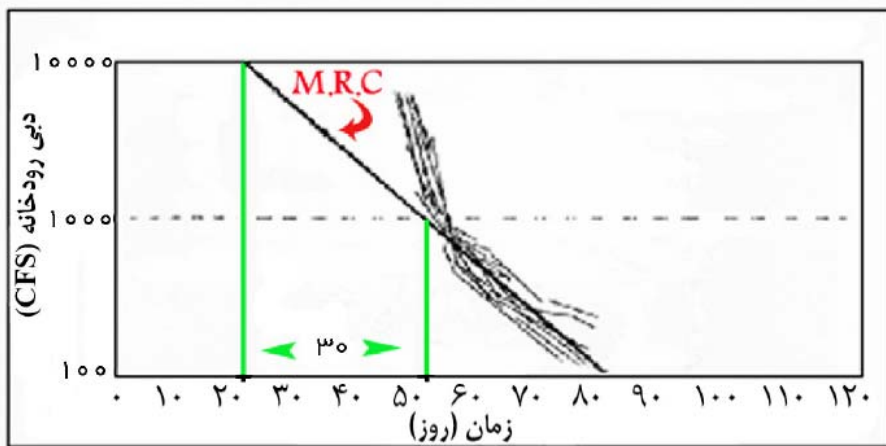
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) Q_2 (

(K)

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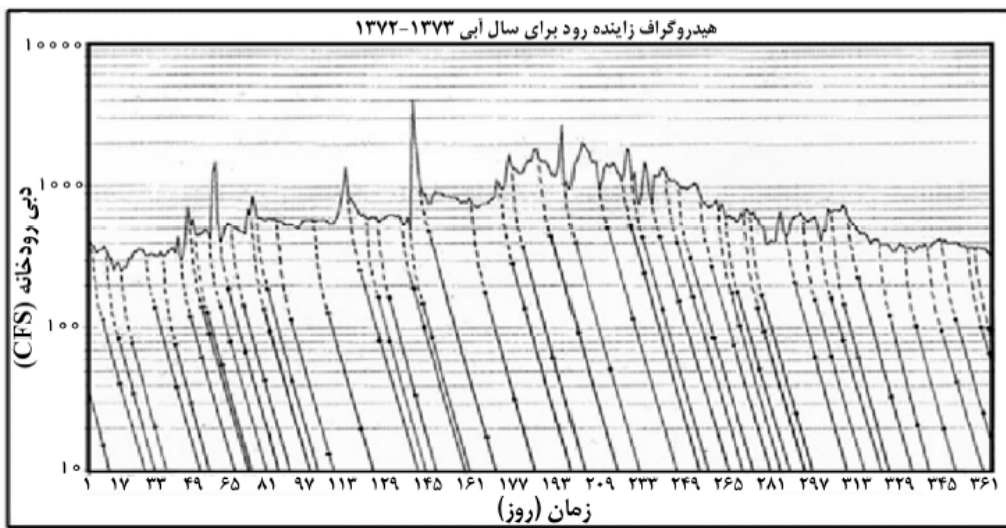
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Arc

(ft³/s * / = m³/s :)

...



($\text{ft}^3/\text{s}^* / = \text{m}^3/\text{s} :$)

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"RORA"

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(
$$V = \frac{2(Q_2 - Q_1) \cdot k}{2.3026} 86400$$
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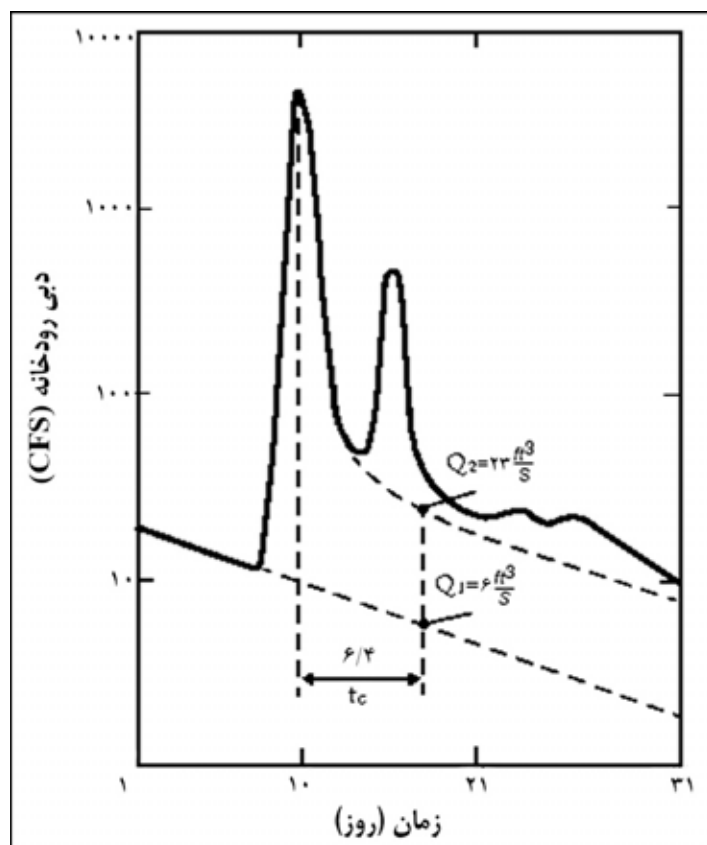
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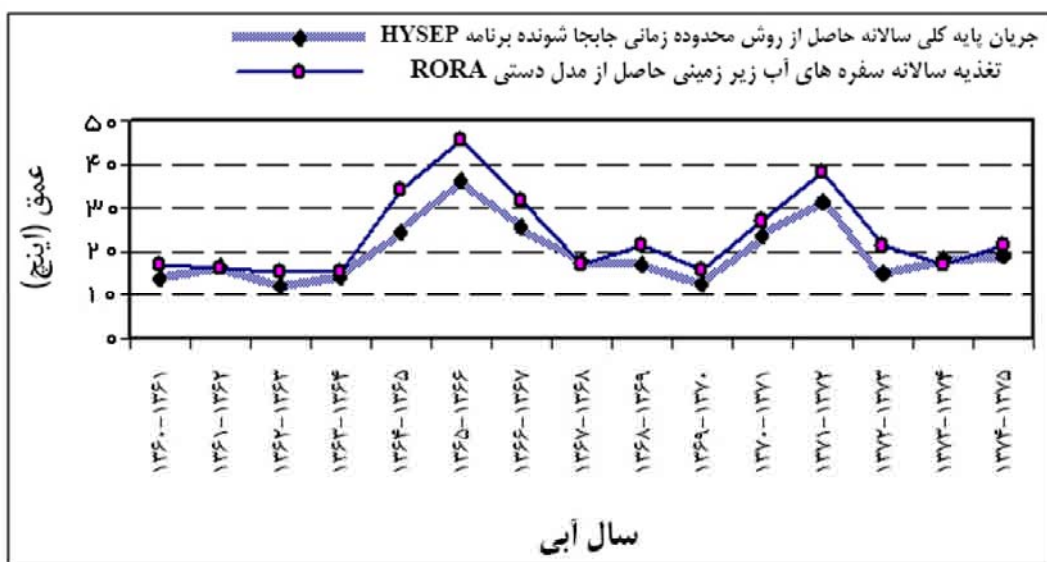
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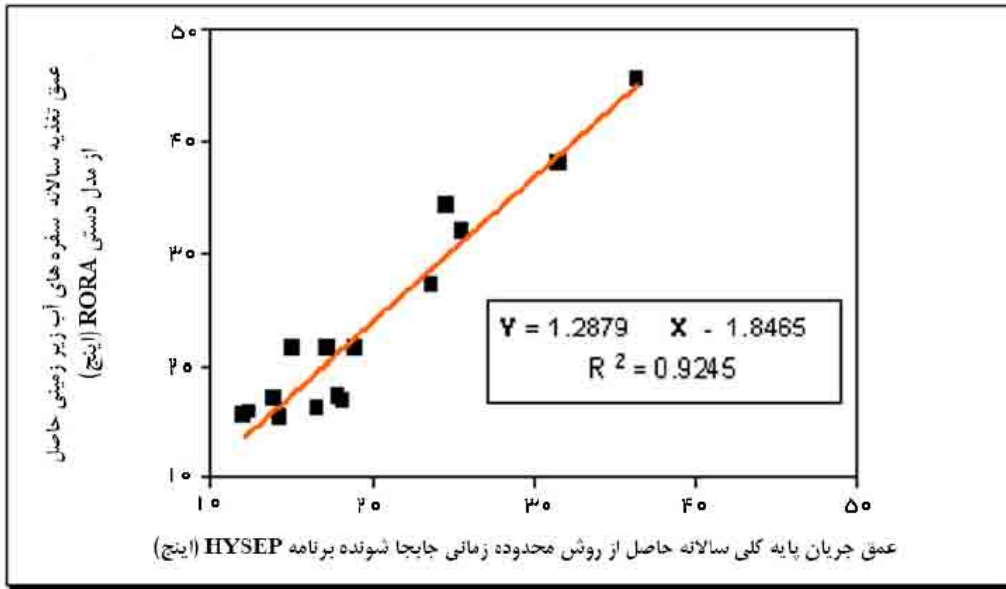
"RORA"



"RORA"

"HYSEP"

(in. * / = mm :)



(in. * / = mm :)

"HYSEP

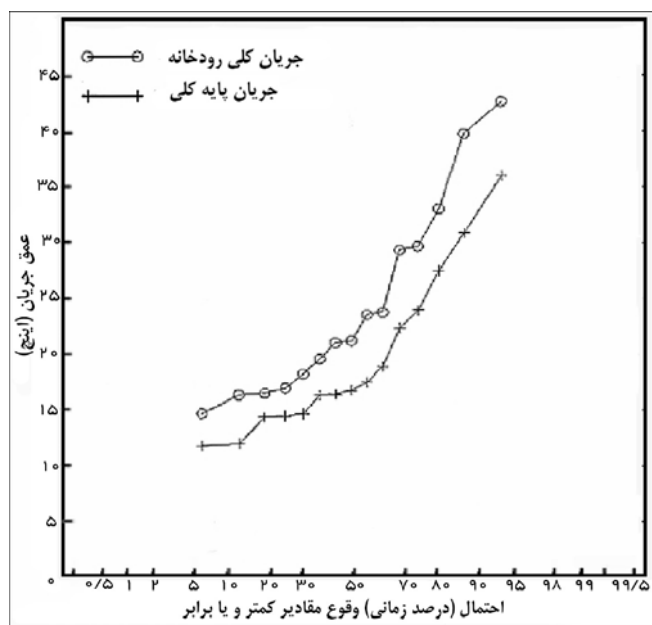
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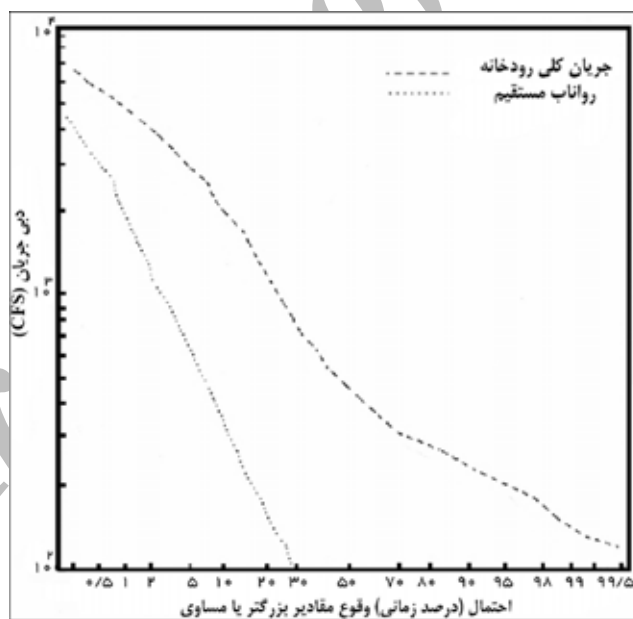
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(in. * / = mm :)



(ft3/s * / = m3/s :)

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