

(2003 / 1423) 57-3 1 14 :

:

-

-

-

5

:

.

.

:

!

)

!

)!

-

-

.

:

.

:

.

.

.

: : .

.

:

.

:

:

.

.

()

()

()

.

.

.

-

-()

()

.

7

:

.

.

.

()

.()

.

.

.

.

)

.(

. * ◀

..... ▶

(31) *

.

:

(1)

:

.

.() : _____

()

.()

:

·
: _____ ()

()

·
·
: _____
()

*

!

!

!

*

[3] () () :

(1)

- -
(2)

:

$$Y=f(P_w,P_o,I,T)$$

Y :

:

P_w

P_o

I

11

:

T

Pw

.

(1)

.

الإسراف

الاعتدال

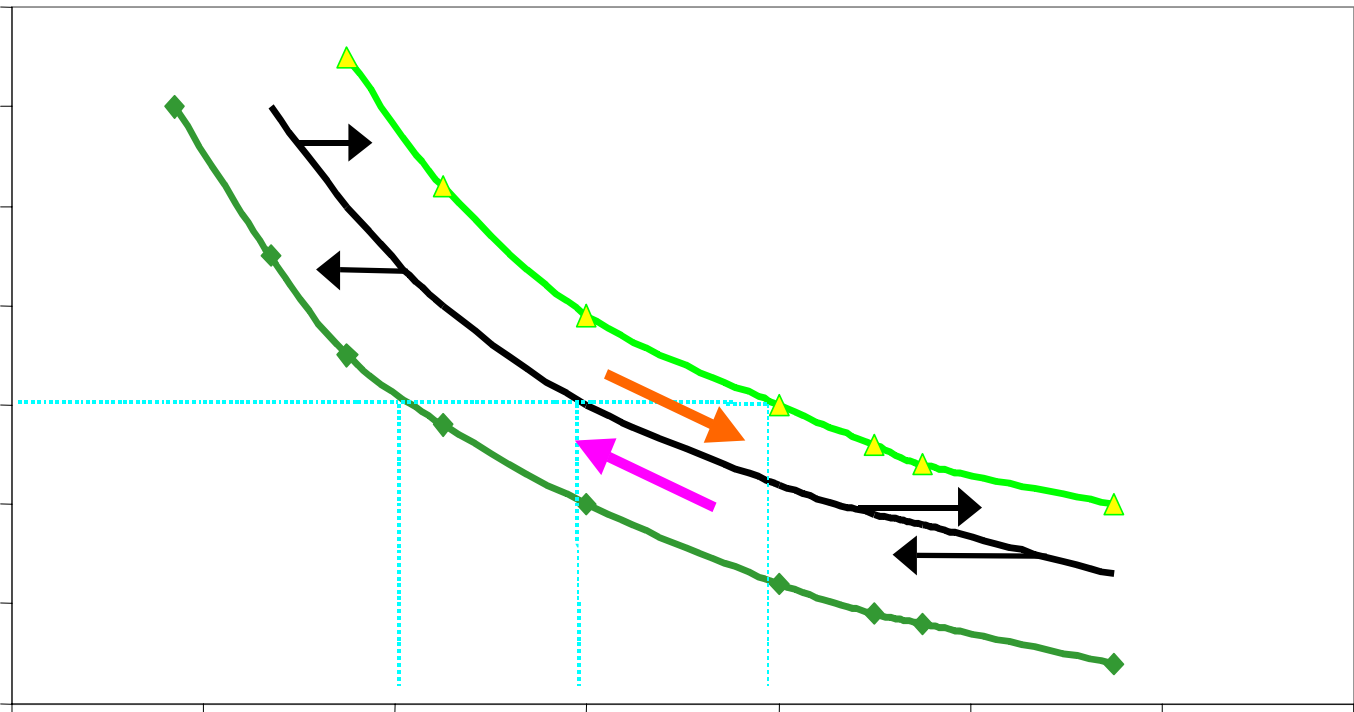
التفتير



13

:

(1)



15

:

()

.

.

:

:

[4]

22

)^[5]

(1415

[7•6]

7 - 4

[9•8]

17

:

450

3000

100

400

500

[10]

..

[11]

.

.

.

.

:

-

-

-

(1)

19

:

% 78

[13*12]

% 90 -

%10

(2)

[15*14]

4.7

()

() 2.6

(1)

1420

1400

2361	79	450	1832	1400
	(%3)	(%19)	(%78)	
8600	180	1020	7400	1405
	(%2)	(%12)	(%86)	
16501	248	1403	14850	1410
	(%1.5)	(%8.5)	(%90)	
16500	375	2125	14000	1420

:

()

()

70-60

. (352-264)

()

()

3

3

(1)

(3 400)⁽²⁾
140

Handwritten signature or mark

" (1)
(2)

23

:

(3)

. (3)

(3)

(/ /)

				*
--	--	--	--	---

%20	5	6	4	
%6	1.4	2	0.75	
%17	4.4	5.25	3.5	
%13	3.12	5	1.25	
%21	5	6	4	
%17	4.4	5.25	3.5	
%6	1.4	2	0.75	**
%100	24.72	31.5	17.75	

8

*

**

:

25

:

[16]

٤٤٤

.

. ()

[17]

38 22

()

400

٤٤٤

(1)

.

٤٤٤

(1)

. (194) .

. /3 41000

– (9)

(5)

(4)

–
[18]

1419

(4)

(/ /)

82.50	95.00	70.00	
54.05	76.00	32.10	
42.35	56.80	27.90	
8.70	13.60	3.80	

:

20.00	25.00	15.00	
24.80	41.70	7.90	
4.00	5.00	3.00	
236.40	313.10	159.70	

(5)

(/ /)

1-	4.00	5	
18.6	20.00	1.4	
49.65	54.05	4,4	
39.25	42.35	3.1	
3.70	8.70	5	
78.1	82.50	4,4	*
23.4	24.80	1.4	
211.7	236.40	24.7	

*

(5)

. (7)

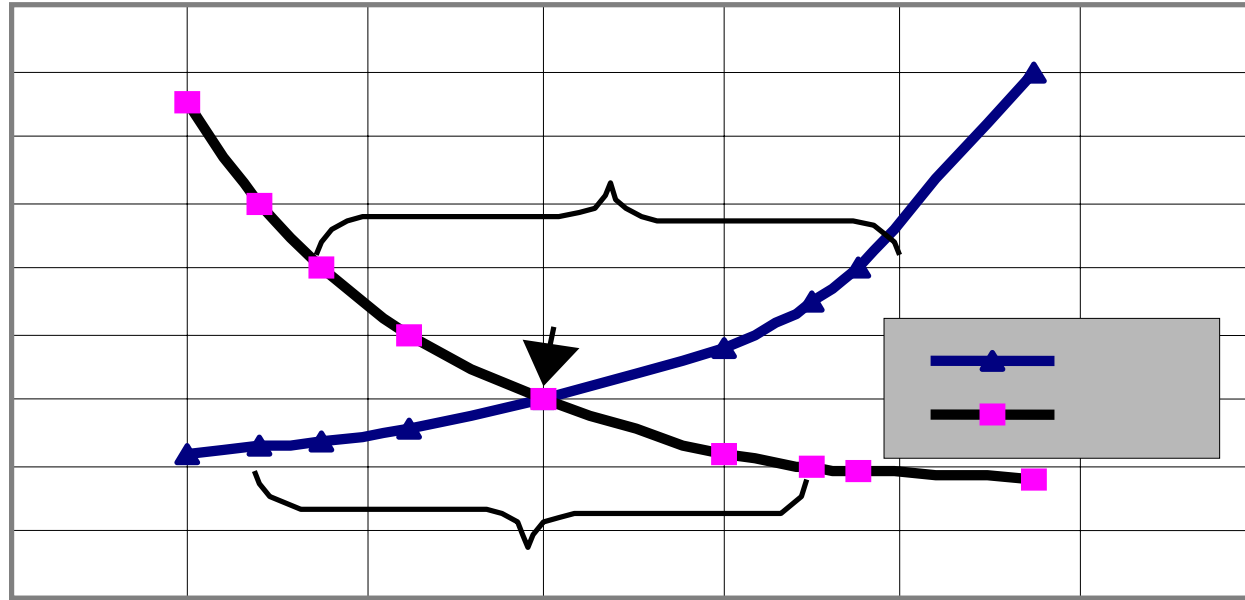
179

25

(9 7)

) (22)
(6) (3)
(2,1)
(2)

[21·20·19]



(3)

(6)

(9)	(8)	(7)	(6)	(5)	(4)	(3)	(2)	(1)
(/ /)	(3 1000)	(3 1000)	(3 1000)	(3 1000)	(3 1000)	(3 1000)	() (1413)	
129.4-	107	103	5.4	108.8	27.2	136	966	
73.4-	163	99	5.2	104.0	26.0	130	608	
76.6	313	883	46.5	929.6	232.4	1162	2819	
89.4-	147	302	15.9	318.4	79.6	398	2058	
99.4-	137	57	3.0	60.0	15.0	75	416	
127.4-	109	134	7.0	140.8	35.2	176	1224	
197.4-	39	11	0.6	12.0	3.0	15	293	
114.4-	122	14	0.7	14.4	3.6	18	112	
138.4-	98	21	1,1	22.4	5.6	28	218	

%20

(4) 236.4

(+)

(9)

(-)

.%5

[22]

60

[23]

.

!

.

.

.

:

()

.

[24]

.

.

.

33

:

57

(15)

[25]

(20)

(5)

()

.

.

[16] 50 7

.

.

.

.

()

)

(

:

-

()

()

()

.

.

.

.

.

.

.

:

:

.

:

.

40

-

:

- 1

600

(

)

400

41

:

. %30

- 2

.....

- 3

.

917

. / 68

/ 712

- 4

:

%40

[29-28]

[30]

(8)

% 80

[21] %2

(8)

43

:

29.3	2	7	34	3	59	80	25	9	67	(%)

(Water Saving Devices)

45

:

..

.

-

.

.

.

% 25-15

.

% 5

.

:

- 1

- 2

.

:

.

:

-

()

()

)

(

[14]

% 5

[32:31]

(2.5)

:

-

49

:

% 37

[35,34,33,18]

.(9))

[16]

%40

:

-

%30 - 15

[37 36]

60-30

%8

[39-38] %3

% 50

(/ /)

(9)

AWWARF 1999	Linaweavr et al .1967	Flack . 1981	Noori .1983	
70	95.0	95.0	74.8	
(%30.9)	(%27)	(%40)	(%48)	
48.4	76.0	75.6	32.1	
(21.4)	(%32)	(%30)	(%21)	
41.7	37.0	11.3	7.9	
(%18.2)	(%15)	(%5)	(%5)	
56.8	34.0	37.8	27.9	
(%25.1)	(%14)	(%15)	(%18)	
3.8		11.3	13.6	
(%1.7)		(%5)	(%8)	

6.1		11.3		
(%2.7)		(%5)		
226.4	242.0	242.3	156.3	
(%100)	(%100)	(%100)	(%100)	

.

:

-

.

.

:

-

.
)
.()

50
500
(

200

()

:

.

:

-

.

.

.

(1)

:

■

6768

(1)

419

(5)

() ()

-
-
-
-
-

19 13164 !! [1]

. 1999 5 1420 [2]

. 1999/5/8 1420/1/22 11942 [3]

Polypipe. Group of Companies, Automatic flush models, *internet site* :
http://www.polypipe.plc.uk/new.htm [4]

1364
. 1416 21

- [5]
- 1366
- 1416 6
- 12 11463 [6]
- 1415 [7]
- ! . . . : 1995/10/28 1416/6/4 11893 [8]
- Recent Development in Seawater Desalination in Emirate of Abu Dhabi, *Water Desalination Report*, April 5, 2001. [8]
- Murakami, 1995, *Managing Water for Peace in the Middle East: Alternative Strategies*, United Nation University Press, 319 pp. [9]
- 6 1366 [10]
- 1416
- Abu-Rizaiza, O.S., Mohamed N. Allam, Water Requirements Versus Water Availability in Saudi Arabia, *Journal of Water Resources Planning and Management*, Vol. 115, No. 1, January, 1989. [11]
- [12]
- 1994 5
- 1410 [13]
- 1415 [14]
- 11 1415 [15]
- 79 [16]
- [17]
- [18]
- 1983 [19]
- 1413 [20]
- 1413

- k.h.al-dhowalia,a.a.quraishi,u.sendil** Assesment of Leakag in the Riyadh Water Distribution Network, *KACST Project No.Ar-10-19* , Final Repport.Vol.1, July 1992, Moharram 1413 [21]
- (:) [22]
- 1421/4/1 3/26 [23]
- () [24]
- International Report on Unaccounted for Water and the Economics of Leak Detection, *IWSA Seminar, 1991.* [25]
- 2000 20 1421 16 [26]
- : [27]
- 1416 20 1396 [28]
- 1417 [29]
- 1416 [30]
- 9717 : [31]
- 1993/12/26 1414 13 [32]
- 20 [33]
- 2000/6/23 1421/3/21 12354 [34]
- 48 [35]
- 2000/5/27 1421/2/23 13548 [36]
- Flack, J.E.**, 1981, Residential water conservation: American Society of Civil Engineers, *Journal of the Water Resources Planning and Management Division, Proceedings Paper 16080*, p. 85 - 95. [37]
- Linaweaver, F.P., Jr., J. C. Geyer, and J. B. Wolfe.** 1967. *A study of residential water use.* Johns Hopkins University. Prepared for the Federal Housing Administration and the Department of Housing and Urban Development. [38]
- AWWARE, American Water Works Association Research Foundation,** [39]

ISBN 1-58321-016-4, Softbound, 1999, 310 pp. Catalog no 90781.

World Health Organization, Regional Office for south-east Asia, new delhi,1984. *Low-cost water supply and sanitation technology : cost pollution and health problems.* [36]

World Health Organization, Regional Office for the eastern Mediterranean,1987. *Wastewater Stabilization Ponds* [37]

Asian Development Bank, Plani La ,*Water Utilities Data Book, Asian and Pacific Region, ,* November 1993. [38]

Lackington D W, Leakag Control, Reliability and Quality of Supply, *Civil Engineering Systems, 1991,* Vol. 8. [39]

Reid, G.; Coffey, K. (Editors), *Appropriate Methods of Treating Water and Wastewater in Developing Countries,* The University of Oklahoma Bureau of Water and Environmental Resources Research , Sponsored by : U.S. Agency for International Development, Washington, D.C. , 1978. [40]

:

: () /

: (

):

(/ 30).

/5 - /14 - /44 7,43 - /50 - /74)
 - /68 - /12,28 - /39 - /27 - /54
 . (/25 - /11

: (

)

. (/ 22)

/11 - /99 - /6 - /43 - /164)
 - /35 - /10,65 - /22 - /16,32 - /17
 - /60 - /48 - /39,45 - /18 - /63
 - /8 - /10 - /24 - /63 - /23
 - /16 - /9 - /15 - /11 - /21 - /27
 . (/6 - /14 - /20,27

:

: () :

:

: /

_____ /1

. (/256) <.....

_____ /2

<.....

. / 6

: /

:_____ /1

<

. /10

:_____ /2

. /24 <

:_____ /3

/10 <

. /21 - /14

: /

..... >

<

. /38 /29

63

:

:

:()

"

عنه

9060

"

.23227

:()

"

عنه

"

8554 8612 9112 9717 10252 :

3254 191

. 434

.6872 7484

:()

"

عنه

:

3734

"

.145 :

3510

15678

17229

19141

23676

:

131/2

