

TBM

-

3 2 *1

-1

-3 2

1391/10/27 : 1391/08/02 :

(TBM)

TBM

(AR: Advance Rate)
(PR: Penetration Rate)

(Sanio) (Roxborough & Phillips)
(Boyd) TBM

[2] [1]

20 TBM

Colorado) CSM

[3]

(School of Mines

Farmer)

(Graham)

(Tarkoy)

(Nelson)

(& Glossop

[7] [6] [5] [4]

(Innaurato)

(Cassineli)

(Park)

[14]

(Grima, et al.)

Q RQD RSR RMR

NTH

[11]

[10]

[9]

[8]

(UCS)

Q_{TBM}

[12]

(CFF: Core Fracture Frequency)

Q

(Barton)

(RPM)

[13]

[15]

Q_{TBM} NTH

RQD

[16]

(Yagiza, et al.)

1391 1 1

[17]

[17]

[18]

RQD

-2

[19]

673 26
 (TBM)
 400 1000
 1 TBM

[20] TBM -1

26 (KM)
 673 (m)
 42
 90 (mm)
 432 (mm)
 0.905 (1/min)

1

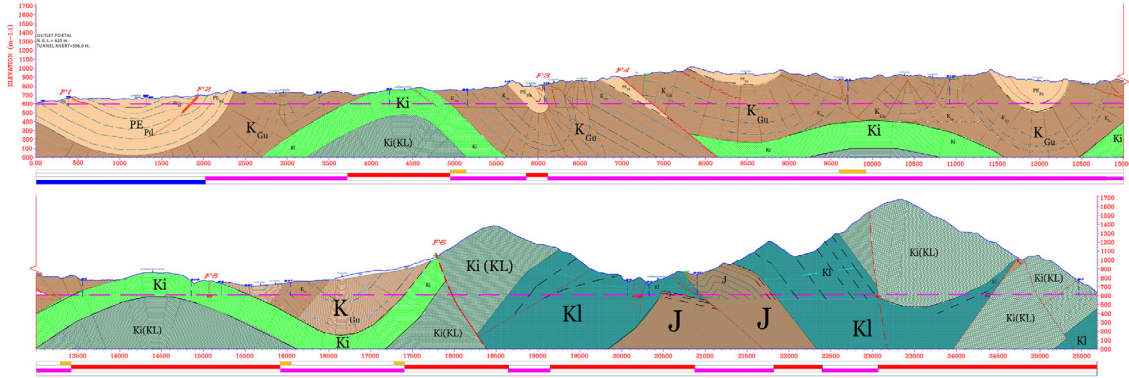
SH LI :
 LS ML MA

[21]

21

(2)

10



[20]

-1

-3

-2

(

)

()

-3

(2)

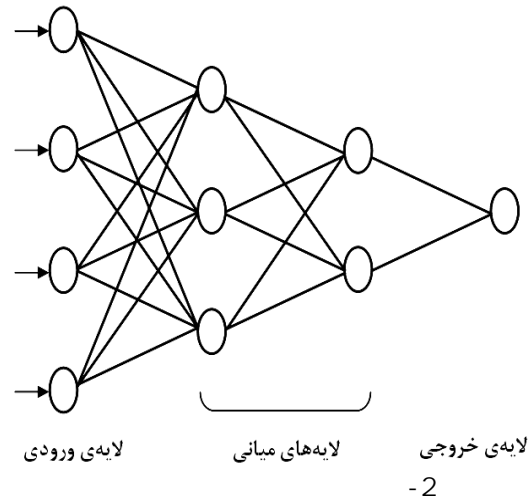
-1

[21]

10

-2

(%)	(gr/cm^3)	RMR	RQD (%)	(MPa)	(MPa)	
10-15	24-25	48	68-75	1-3	10-30	SH-ML 1
10-15	23-25	44	52-60	1-3	15-30	SH-ML 2
5-15	23-25	44	50-65	1-3	10-20	SH-ML 3
2-5	25-26	62	85-72	5	50-100	ML-SH 1
5-10	22-25	48	70-60	1-3	15-30	ML-SH 2
5-15	205-25	46	65-50	2-4	25-50	ML-SH 3
5-10	22-25	50	75-65	2-4	15-30	ML-SH 4
3-5	23-26	49	85-75	5	50-100	ML-SH 5
3-15	24-25	44	70-60	1-3	15-30	SH-LS 1
3-10	23-26	50	80-75	2-4	30-50	SH-LS 2
5-15	23-25	44	75-65	1-3	15-30	SH-LS 3
5-10	23-26	48	75-70	2-5	15-30	SH-LS 4
25-6	25-26	57	90-80	25-6	100-150	LI 2



()
[23] [14]

[22] [24]

[22]

()

(Feed Forward Back Propagation)

-1 1

[24] [23] [14]

[22]

(Training) -1

(Generalization) -2

(Operation) -3

[23] [14]

.- 4

.-1-4

TBM

-1

-2

RQD)

-3

(RMR

RMR

9

RQD

:

()

-1

10

()

-2

()

-3

[26] [25]

() RQD -4

() RMR -5

3 -6

() -7

() -8

() -9

[22]

()

-3

[14]

1

2

3

4

[31]

(Caudill) (Hecht-Nielsen)

I 2I+1

[30] [29] [28] [27]

[33] [32]

.-2-4

11 10 9 8

y=x

[14]

(4)

[24]

+1 -1

10 9 8

5

11

(Tansig)

(Purelin)

-4

Levenberg-

(Marquardt)

3	2	1	
$y=x+2$	$y=x+1.5$	$y=x+1$	
2	1.5	1	(mm/rev)

8

5

5

9x8x1

(Berke)

2 1.5 1

-5

93 68 50

11	10	9	8	
13	19	16	14	1
18	22	21	19	2
20	23	24	26	3
1,36	1,17	1,2	1,07	
0,71	0,74	0,77	0,83	

90

-3

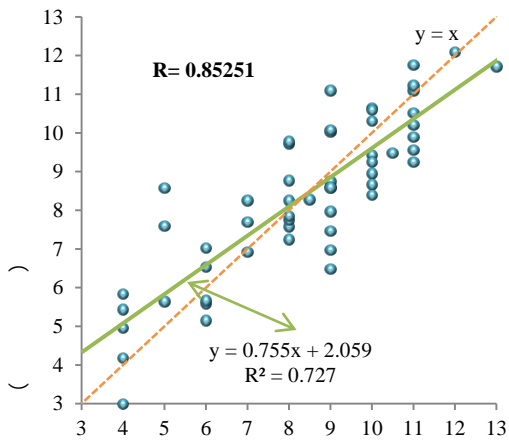
83 85

-4

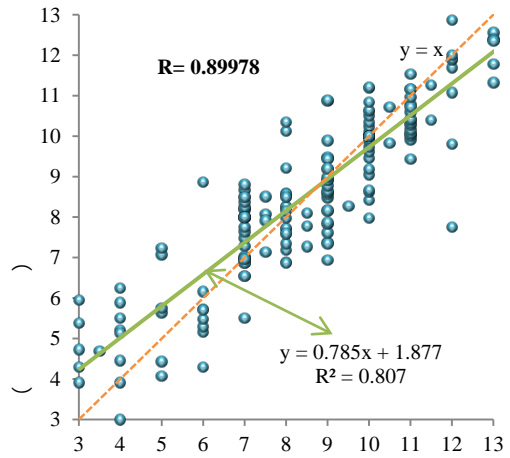
-3

-4

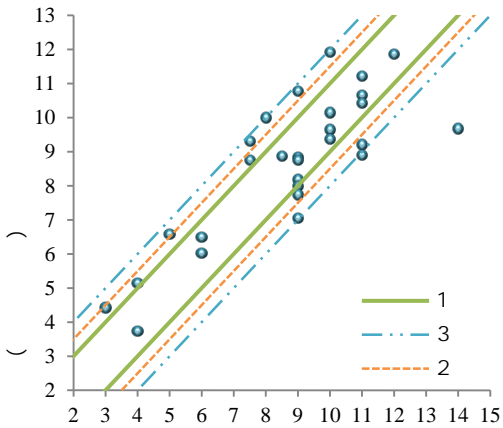
1,07



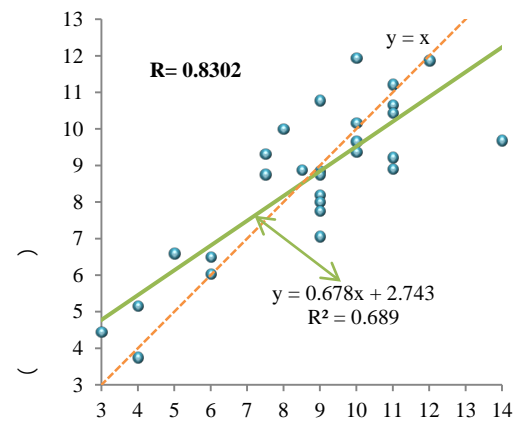
()



()



()



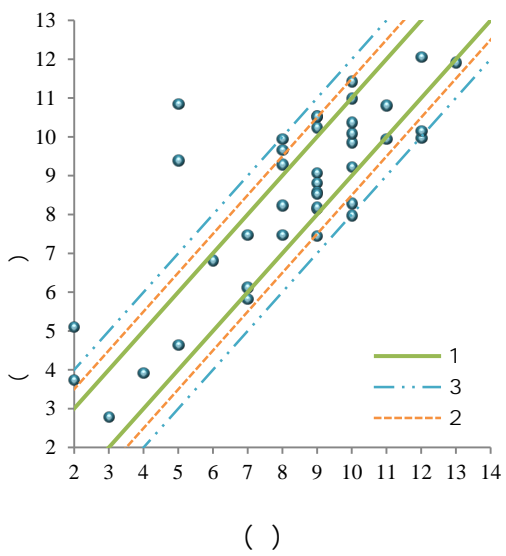
()

-4

(-5) 79
1,17

2 1,5 1
88 70 50

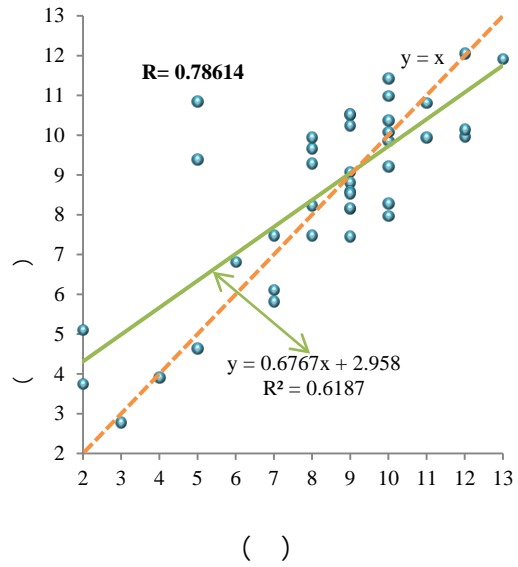
-5



(9x8x1)

) 0,5

(10,5 10
40



-5

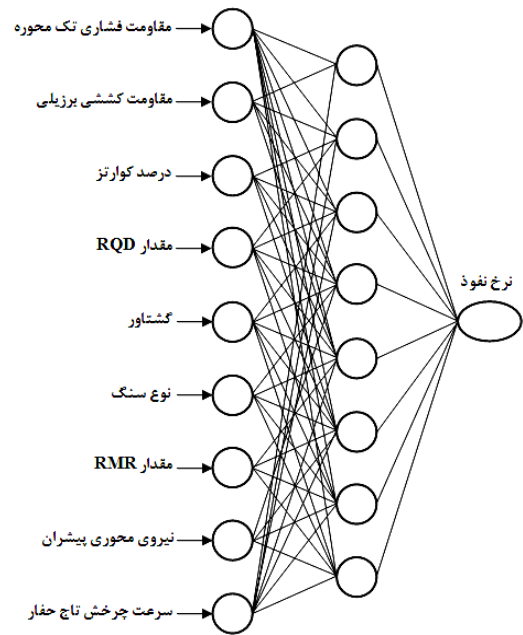
(RPM)

8
(9x8x1)

9
1

(6)

6

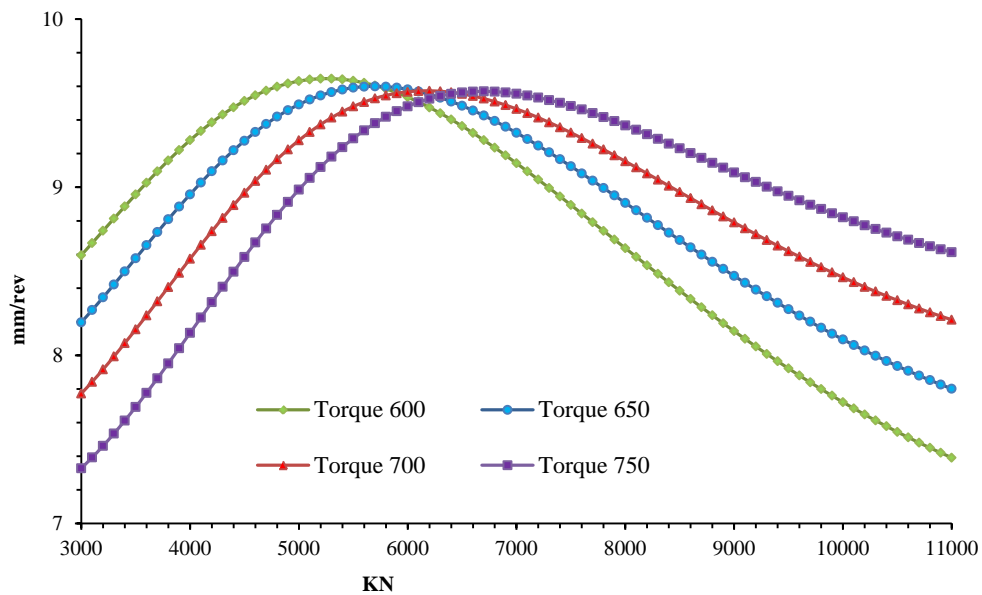


-6

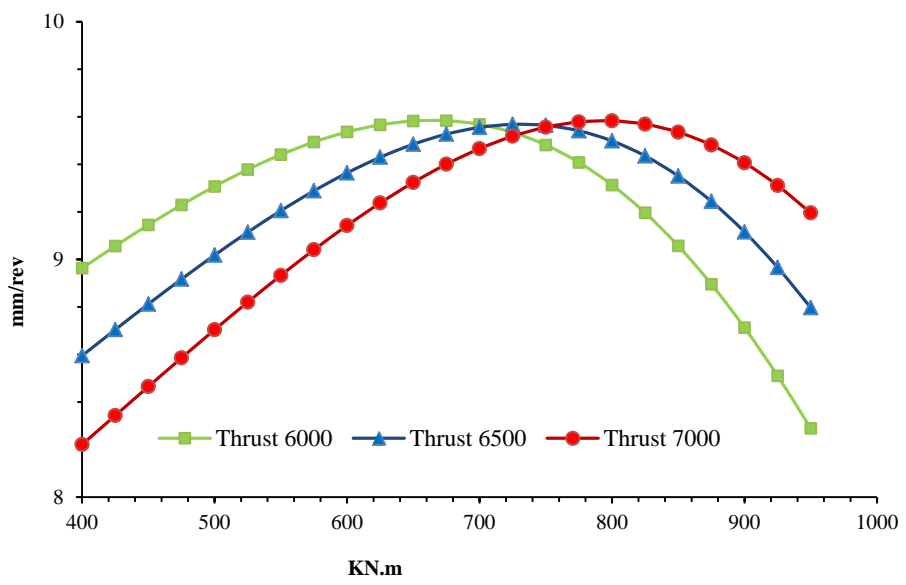
-6

125	(MPa)	
0,5		
4,25	(MPa)	
85		(%) RQD
57		RMR

7



-7



TBM

(Heuristic)

- 6

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