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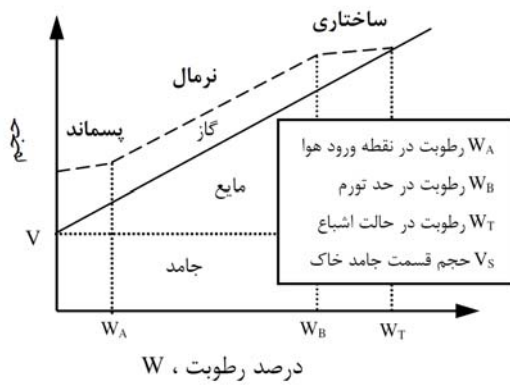
( )

Mishra et al., 2007

Haines (1923)

(Mishra et )

.al., 2007



(Gaurley et al., 1993)

Tripathy et )

(al., 2002

Haines (1923)

Structural )

(shrinkage

(e)

(w)

Normal )

(shrinkage

\*

( )

۸۸	حدروانی (C)
۳۱	حد خمیری (C)
۵۷	شاخص خمیری (C)
۱۳	حدانقباض (C)
۲/۷۵	وزن مخصوص دانه‌های جامد
۷۳	عبوری از الک ۲۰۰ (C)
۴۸	میزان رس (کوچکتر از ۰.۰۰۲ میلیمتر) (C)
۲۵	میزان سیلت (C)
۳۷	میزان ماسه ریز (C)
۱/۱۸	فعالیت (A)

(shrinkage Residual)

(

( )

(Oedometer)

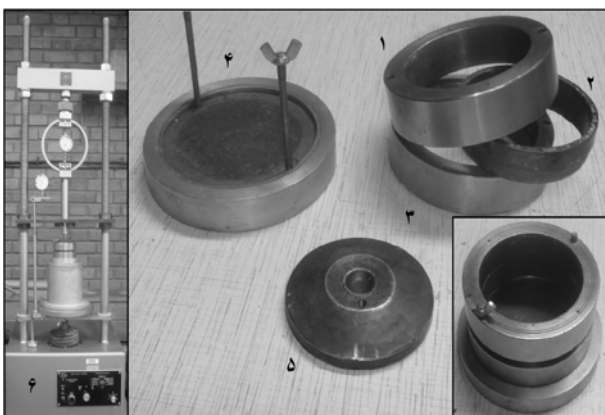
)

.(

)

(McKeen, R.G. (1992)

(Kaolin)



% %

(A)

(PI)

(CH)

: : ( ) : :

w<sub>opt</sub>=20.5 %

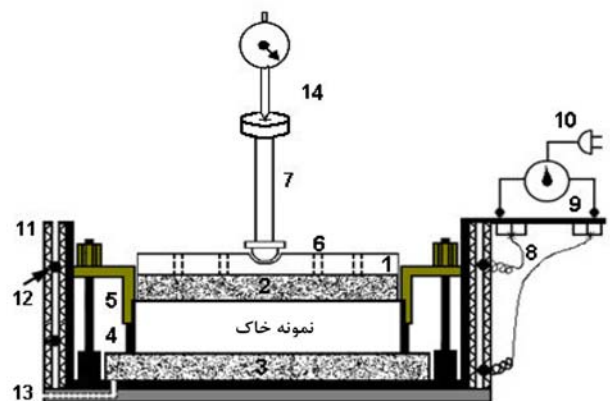
γ<sub>d</sub>=16.1kN/m<sup>3</sup>

ASTM

/ ) %  
kN/m<sup>3</sup>

(

/



( )

: : : : :  
: : : : :  
: : : : :

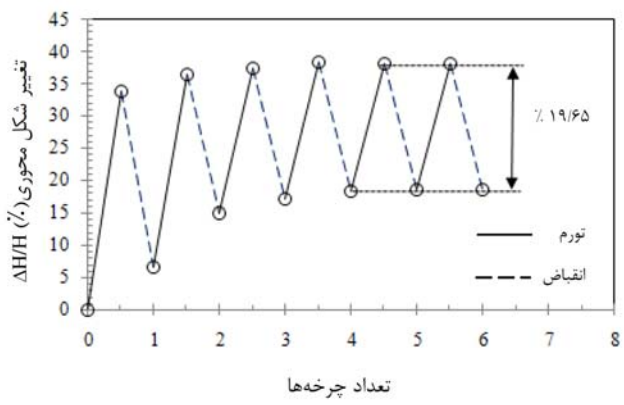
( )

( )

$$\Delta e \quad \Delta V$$

$V_0$

( $H_0$ )      ( $\Delta H$ )



/

/

)

(

( )

$$\frac{\Delta V}{V_0} = \frac{\Delta e}{1+e_0}$$

/

( )

Chen (1965);  
Subba Rao and Satyadas (1987); Chu and Mou (1973)

Adel (1991)

Popescu (1980)

Tawfiq

and Nalbantoglu (2009)

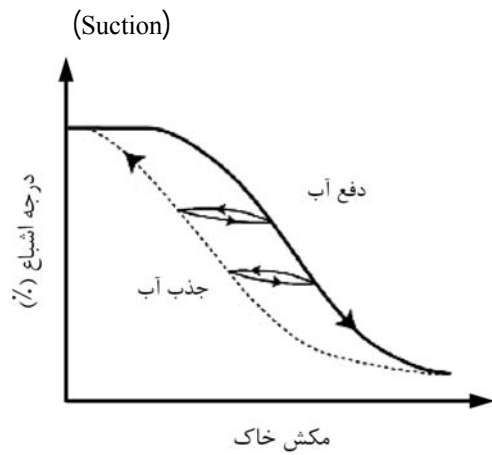
Al-Homoud et al. (1995)

Basma et al. (1996)

(Hysteresis)

(Soil-Water Characteristic Curve)

( )



Alonso et al. (1994)

(Barcelona Expansive Model)

(Microstructure)

(Macostructure)

C B

F E D

(w)

(e<sub>0</sub>)

(A )

B

B

A

( )

C

( )

( )

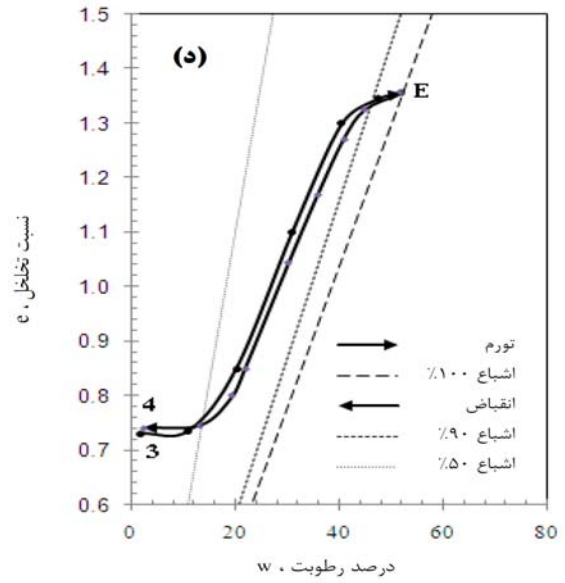
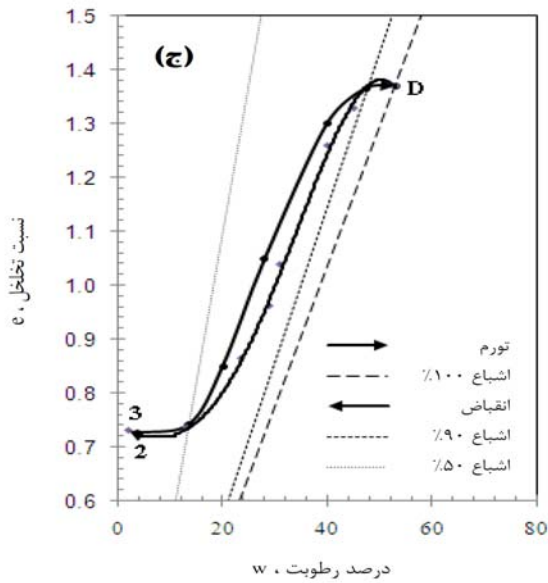
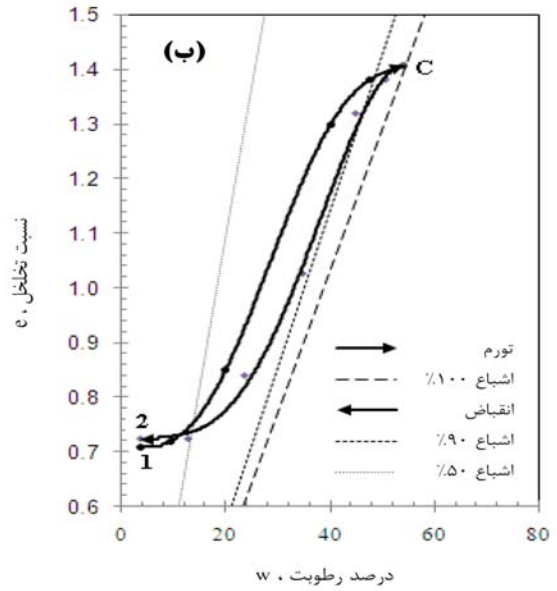
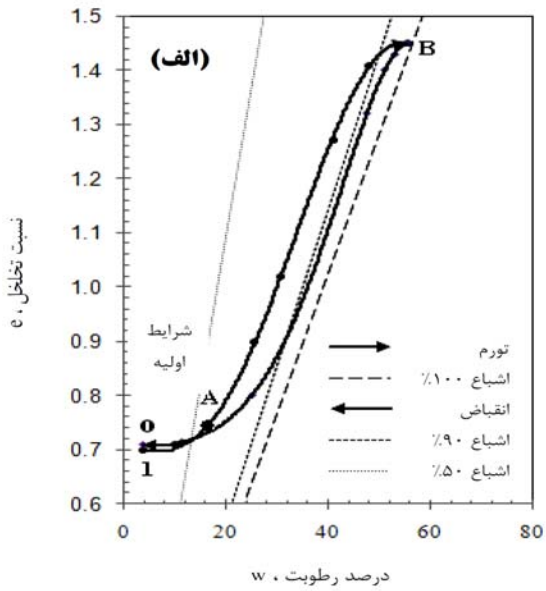
C

(Gens and Alonso., 1992)

D

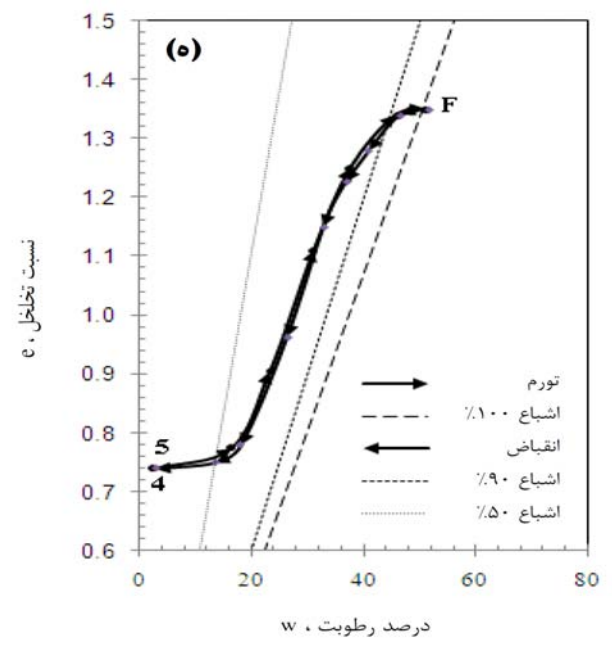
D

( )



( ( ( ( :

Mishra et al. (2007)



S

%

Sitharam et al. (1995); Tripathy et al. (2002)  
 S Ho et al. (1992);  
 Haines (1923)

S

S

(%)

S

- :  $\Delta H/H$  : V
- :  $\gamma_d$  : W
- : e : A
- : PI

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