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(GPS)

GPS

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() Clark () Raper et al. (Morgan &

.Ess,1997)

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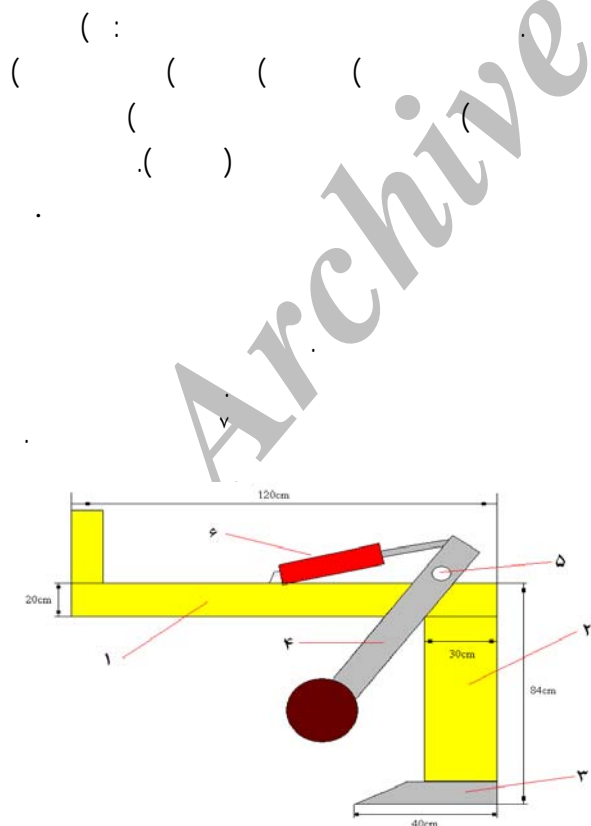
Fulton et al. (1996) .

(GPS) ^Δ

(GIS) ^ϕ

() Taylor & Gardner .

() Clark et al. .



(Hemmat &

() Raper .Adamchuk, 2008)

() Raper et al.,

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Khalilian et al.

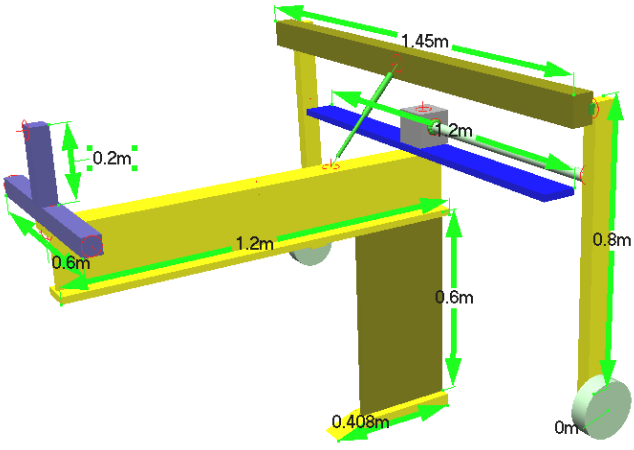
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- 5.Global positioning system
- 6. Geographical information system
- 7. Rake angle

- 1. Precision tillage
- 2. On-the-go
- 3. Cone penetrometer
- 4. Site-specific tillage

() Mouazen & Ramon

() Raper



(Mouazen &

Ramon, 2002)

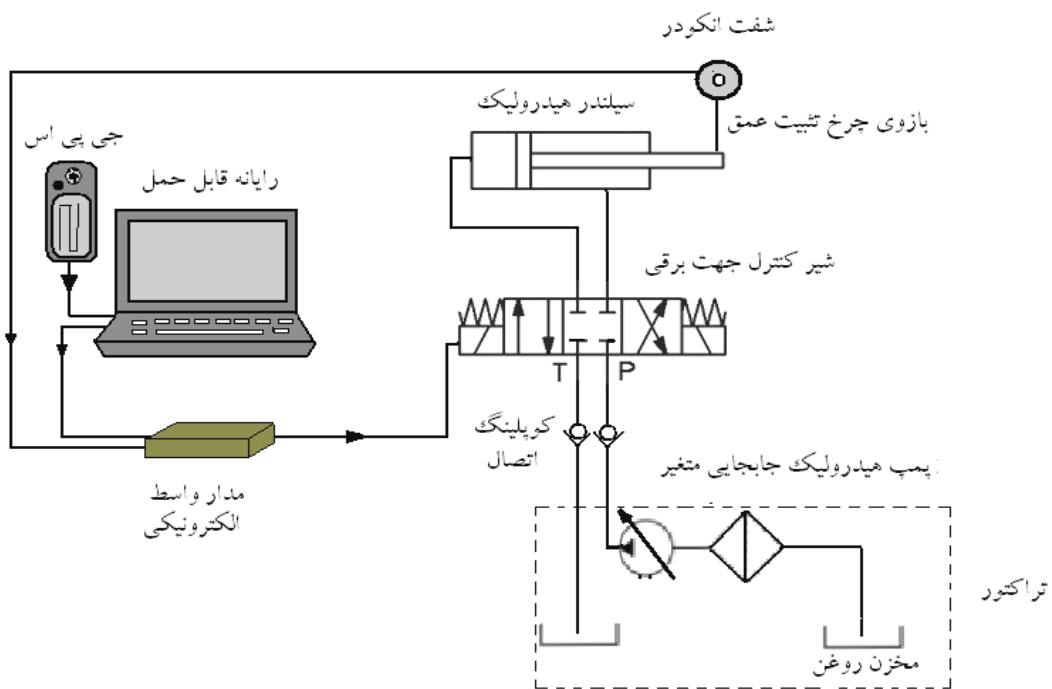
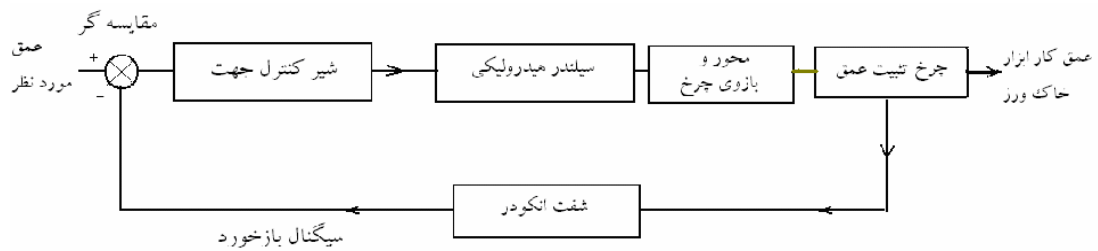
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Working model

GPS

1. Active control
2. Closed loop
3. Feed back signal
4. Shaft encoder

JD



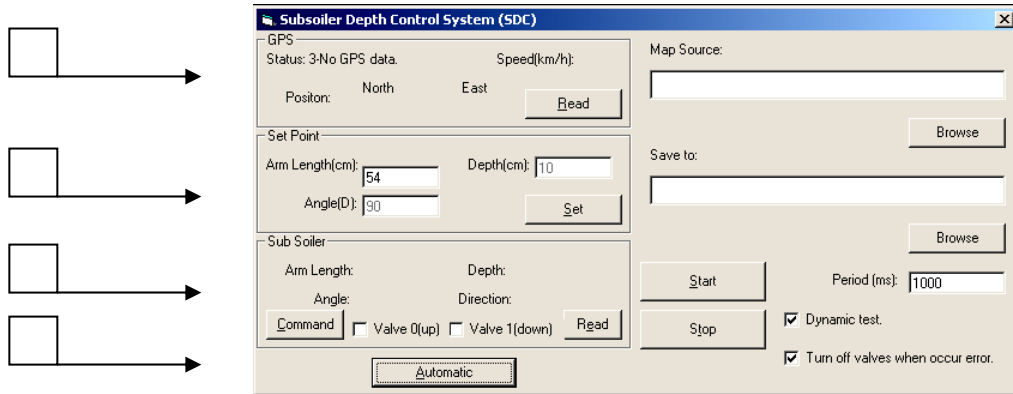
1. Manual
2. Text file

(Automatic)

NMEA

GPS

1. Dialog box



E1 N1 . ()

E2 N2
D

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map1 - Notepad
File Edit Format View Help
N1, E1, N2, E2, D
3242.710, 5131.42, 3242.715, 5131.43, 22
3242.715, 5131.42, 3242.720, 5131.43, 15
3242.720, 5131.42, 3242.730, 5131.43, 20
3242.730, 5131.42, 3242.740, 5131.43, 13
3242.710, 5131.43, 3242.715, 5131.44, 20
3242.715, 5131.43, 3242.720, 5131.44, 30
3242.720, 5131.43, 3242.730, 5131.44, 18
3242.730, 5131.43, 3242.740, 5131.44, 10
3242.710, 5131.44, 3242.715, 5131.45, 13
3242.715, 5131.44, 3242.720, 5131.45, 17
3242.720, 5131.44, 3242.730, 5131.45, 21
3242.730, 5131.44, 3242.740, 5131.45, 14

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1. Response time

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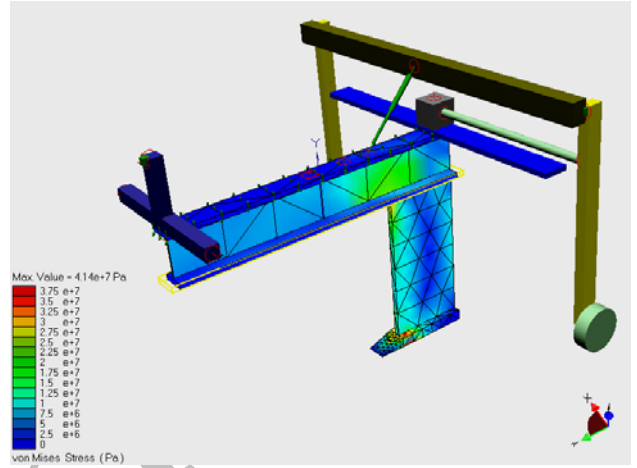
$$E\% = \frac{D_{\max imum} - D_{s \tan dard}}{D_{s \tan dard}} \times 100 \quad (1)$$

$D_{\max imum}$
 $D_{s \tan dard}$

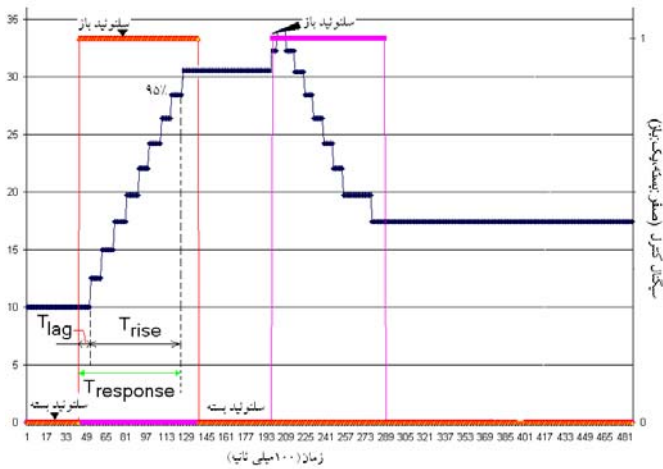
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$$Precision\% = \frac{D_{\max imum} - D_{average}}{D_{s \tan dard}} \times 100 \quad ()$$

$D_{average}$



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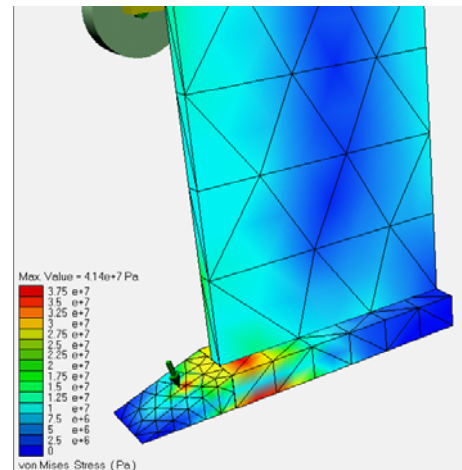
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($\tau = 2.3$)

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1. Rise time
2. Precision
3. Constant time
4. Laplace transformation
5. Unit step input

%

$$D = \left(\frac{1}{s}\right) \left[\frac{1}{1 + \tau s} \right] \quad (1)$$

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$$D(t) = A \left(1 - e^{-\frac{t}{0.04}} \right) \quad (2)$$

A t D(t)

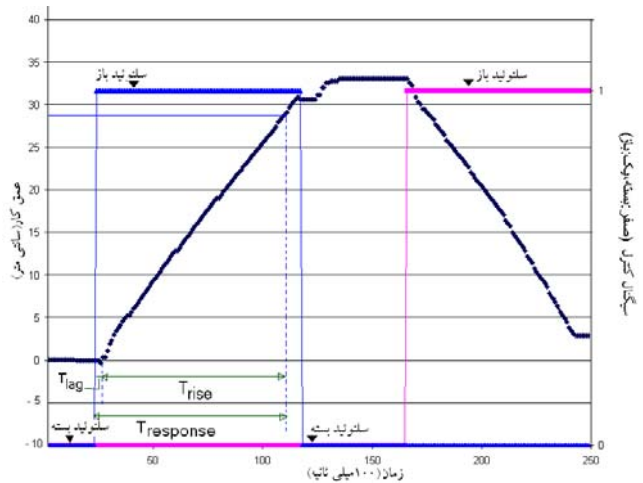
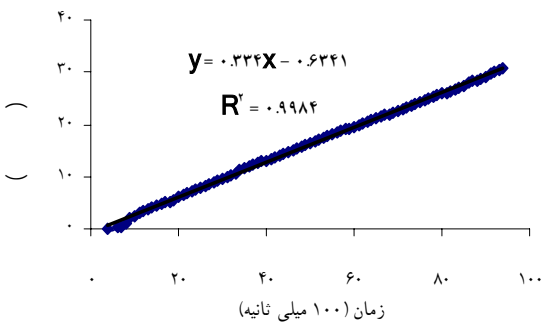
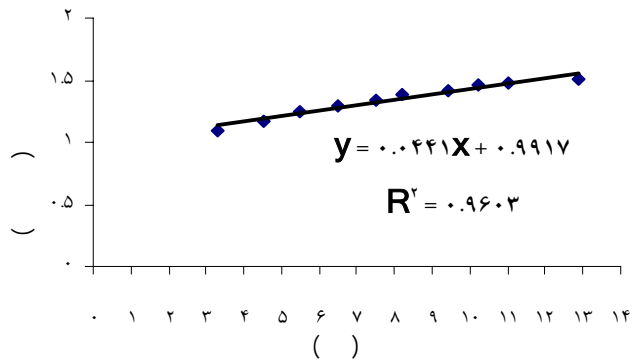
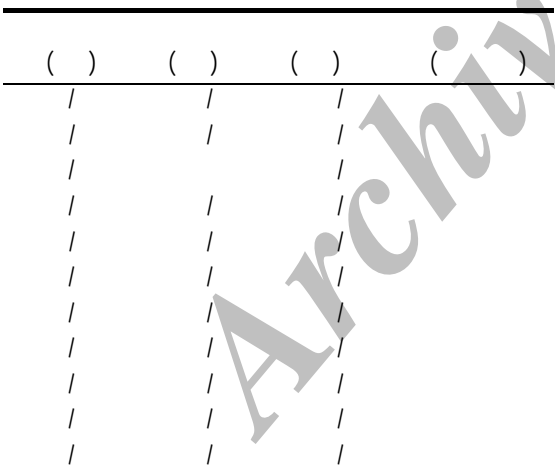
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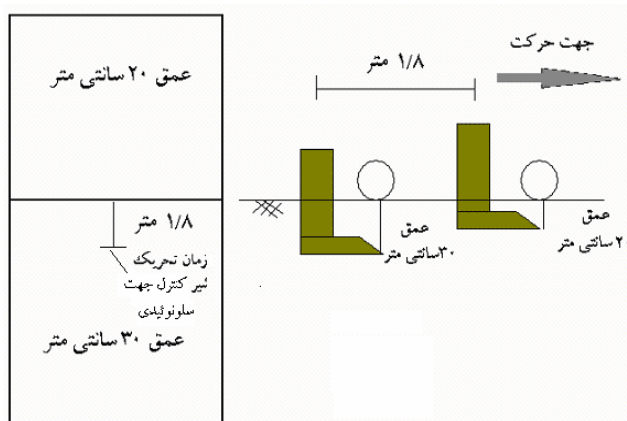
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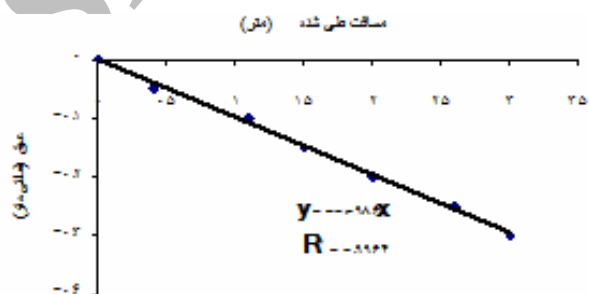
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