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(// // //)

(Sandhu)

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S-N

(Plumtree) [] (Hashin - Rotem) S-N / []

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(Sims) [] (Brodon) [] (Ellyin) [] (El kadi) [] (Sandhu) []

(Plumtree)

N_f [] (Ellyin) (Fawaz)

(Sandhu)

S-N

[] (Philippidis)
(Fawaz)

[] (Kawai)

[-]

(Plumtree)

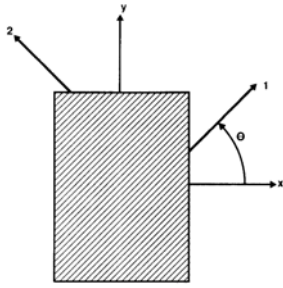
[] (Cheng)

SWT

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[] (Petermann) (Plumtree)

(x-y)



(x-y)

(-)

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[] (Plumtree)

W^*

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$$W^* = \lambda(\sigma_2^{\max} \varepsilon_2^{\max} + \sigma_6^{\max} \varepsilon_6^{\max})$$

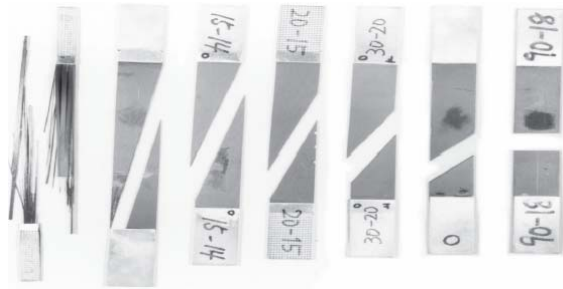
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$$\varepsilon_6 \quad \varepsilon_2 \quad \sigma_6 \quad \sigma_2 \quad \lambda = \frac{1-R^2}{2}$$

R

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0,10, 20, 30, 45, 60, 90°)

S-N

(theta =

/ ()

S-N

[]

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$$\theta_{transition} = \text{Arc tan}\left(\sqrt{\frac{X_t}{Y_t}}\right) = \text{Arc tan}\left(\sqrt{\frac{56.9}{1836}}\right) = 9.98^\circ$$

()

$Y_t \quad X_t$

(-)

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$$\Delta W_I^* = \frac{1}{X \varepsilon_{1u}} (\sigma_{1 \max} \varepsilon_{1 \max} - \sigma_{1 \min} \varepsilon_{1 \min}) \quad (1)$$

() [] (Sandhu)

$$\Delta W_I^* = \frac{1}{X^2} \frac{(1+R)}{(1-R)} (\Delta \sigma)^2 \quad (2)$$

$$R = \sigma_{\min} / \sigma_{\max} \quad (3)$$

$$\frac{\sigma_1 \varepsilon_1}{X \varepsilon_{1u}} + \frac{\sigma_2 \varepsilon_2}{Y \varepsilon_{2u}} + \frac{\sigma_6 \varepsilon_6}{S \varepsilon_{6u}} = 1 \quad (4)$$

$$\Delta W_I^* = \frac{1}{X^2} \frac{(1+R)}{(1-R)} (\Delta \sigma_x)^2 (\cos^4 \theta) \quad (5)$$

$$\sigma_6 \quad \sigma_2 \quad \sigma_1 \quad \varepsilon_6 \quad \varepsilon_2 \quad \varepsilon_1$$

$$\varepsilon_{1u} \quad S \quad Y \quad X$$

$$\varepsilon_{6u} \quad \varepsilon_{2u}$$

() () ()

$$\Delta W_{II}^* = \frac{1}{Y^2} \frac{(1+R)}{(1-R)} (\Delta \sigma_x)^2 (\sin^4 \theta) \quad (6)$$

$$\Delta W_{III}^* = \frac{1}{S^2} \frac{(1+R)}{(1-R)} (\Delta \sigma_x)^2 (\sin^2 \theta \cos^2 \theta) \quad (7)$$

$$\Delta W^* = \Delta W_I^* + \Delta W_{II}^* + \Delta W_{III}^* = \frac{\Delta \sigma_1 \Delta \varepsilon_1}{X \varepsilon_{u1}} + \frac{\Delta \sigma_2 \Delta \varepsilon_2}{Y \varepsilon_{u2}} + \frac{\Delta \sigma_6 \Delta \varepsilon_6}{S \varepsilon_{u6}} \quad (8)$$

$$\Delta W^* = \Delta W_I^* + \Delta W_{II}^* + \Delta W_{III}^* = \frac{(1+R)}{(1-R)} (\Delta \sigma_x)^2 \left(\frac{\cos^4 \theta}{X^2} + \frac{\sin^4 \theta}{Y^2} + \frac{\sin^2 \theta \cos^2 \theta}{S^2} \right) \quad (9)$$

$$\Delta W^*$$

$$Y = Y_t \quad X = X_t$$

$$Y = Y_c \quad X = X_c$$

() () () ()

$$(R \geq 0)$$

$$\Delta W^t = g(N_f) \quad (10)$$

$$\Delta W = \frac{1}{2} (\Delta \sigma_1 \Delta \varepsilon_1 + \Delta \sigma_2 \Delta \varepsilon_2 + \Delta \tau_{66} \Delta \gamma_{66}) \quad (11)$$

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(Kawai)

$$\Delta W^t = k N_f^\alpha + C$$

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(T800H/2500)

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C \propto k

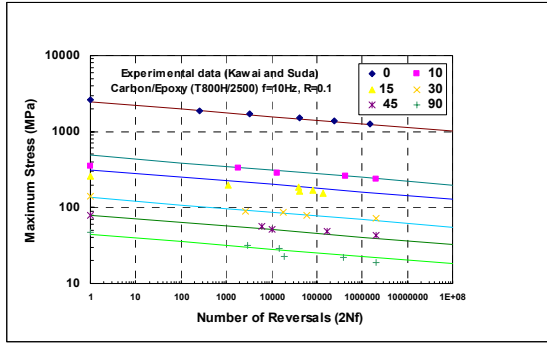
($\theta = 0, 10, 15, 30, 45, 90^\circ$)

α k.

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C



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()

()

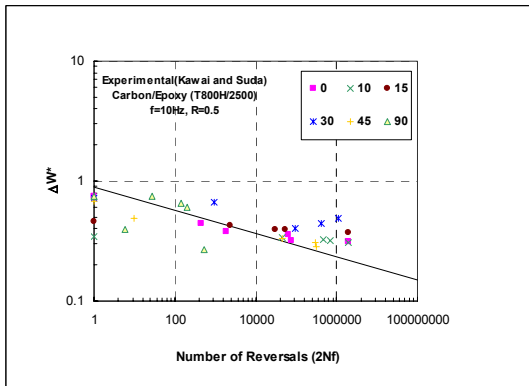
C

$$\Delta W^* = k N_f^\alpha$$

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α k

[] R=0.1



R=0.1 (2Nf)

ΔW^*

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(Plumtree)

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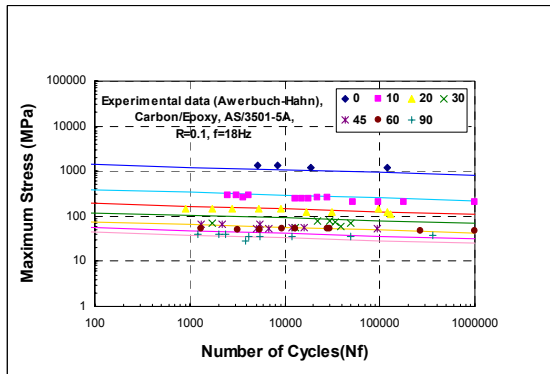
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$$\Delta W^* = 0.8928(2N_f)^{-0.09717}$$

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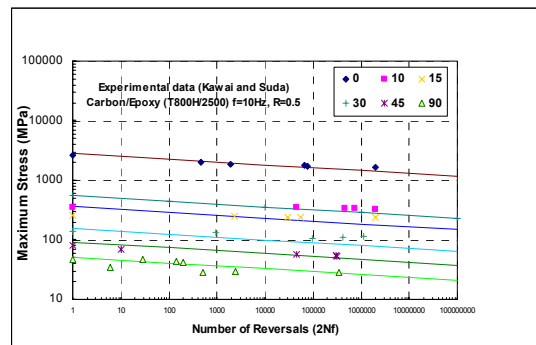
$$\Delta W^* = 1.028(2N_f)^{-0.1211}$$



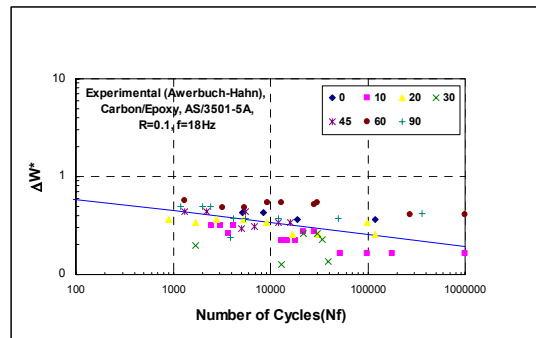
() :
.[] R=0.1

(Plumtree)

(Plumtree)



() :
.[] R=0.5



R=0.1 (Nf) ΔW^* :
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