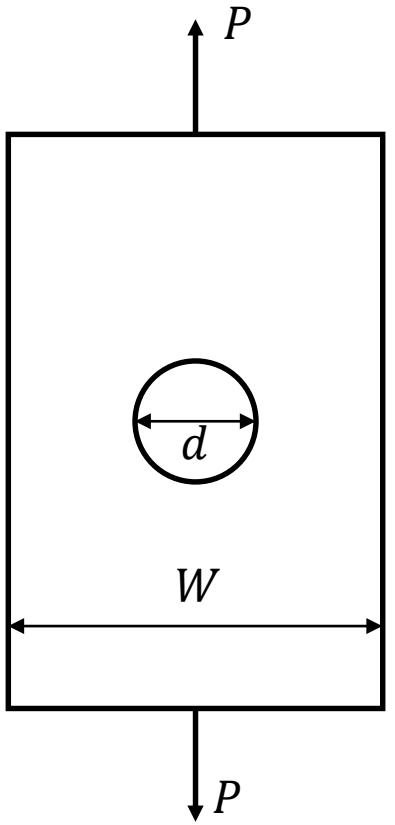
nominal stress $S = \dfrac{P}{(W - d)t}$

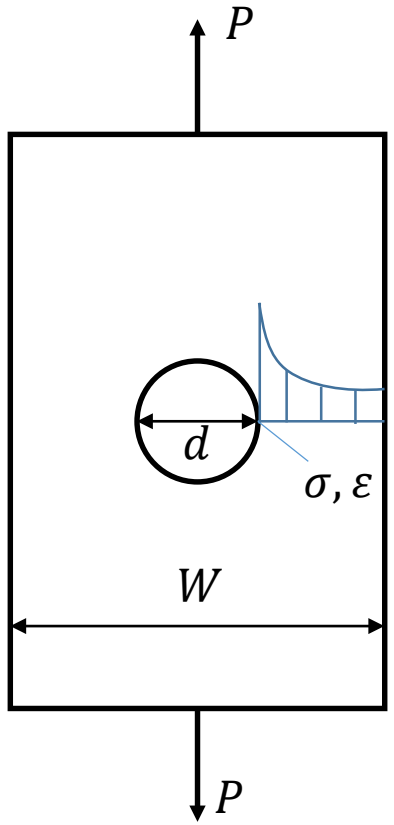
nominal strain $e = \dfrac{S}{E}$



nominal stress $S = \dfrac{P}{(W-d)t}$

nominal strain $e = \dfrac{S}{E}$

needed in strain life approach
- local stress σ
- local strain ε



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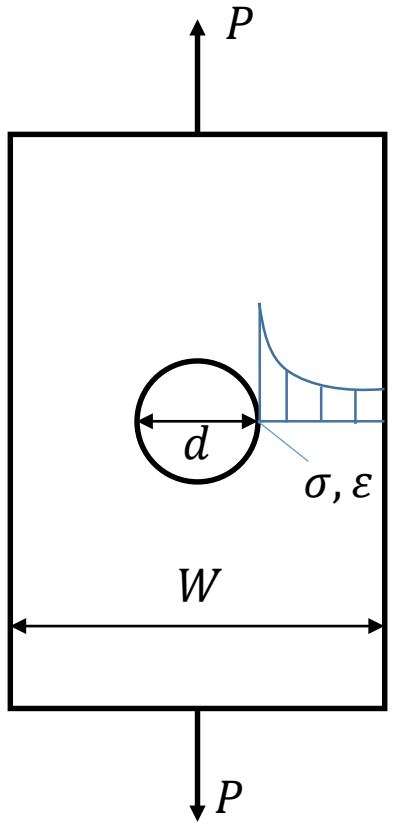
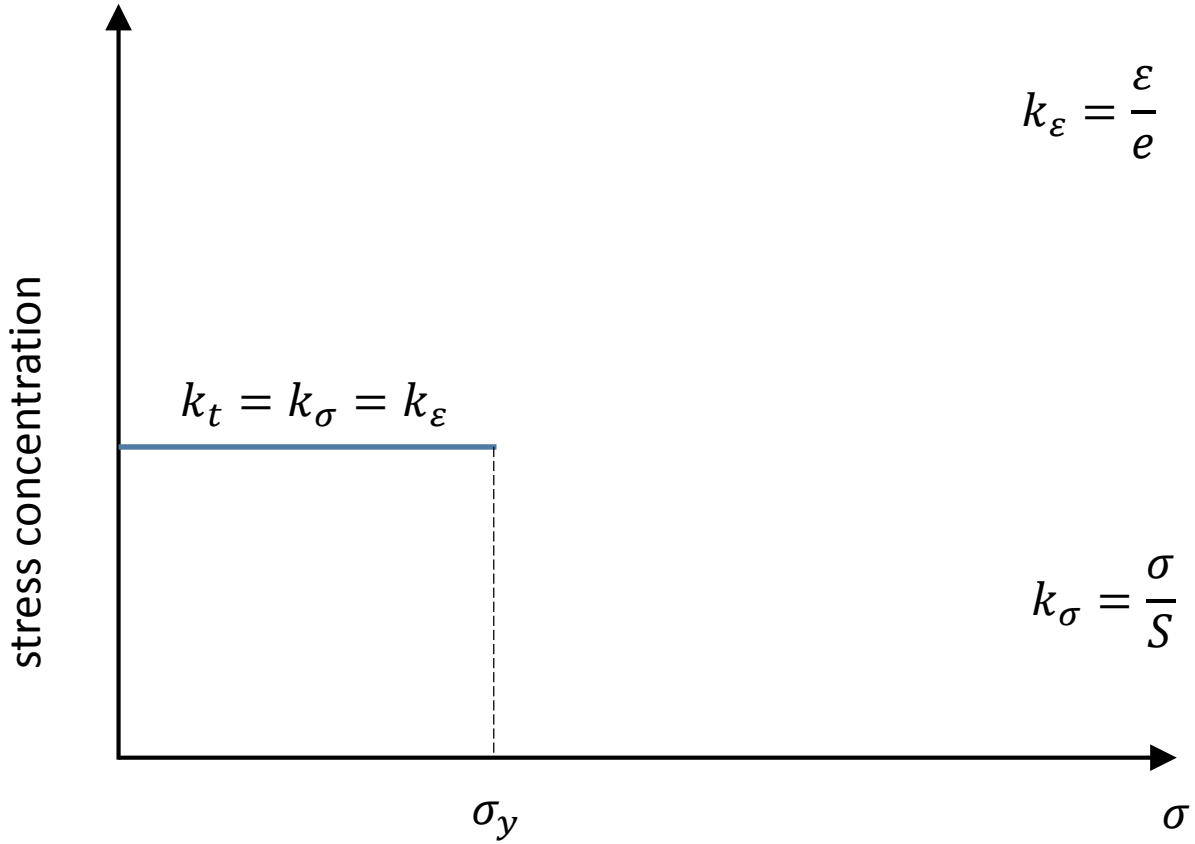


$k_\varepsilon = \dfrac{\varepsilon}{e}$

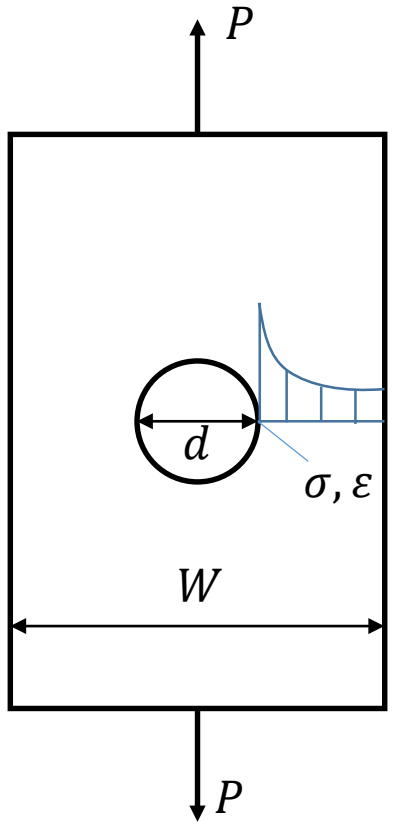


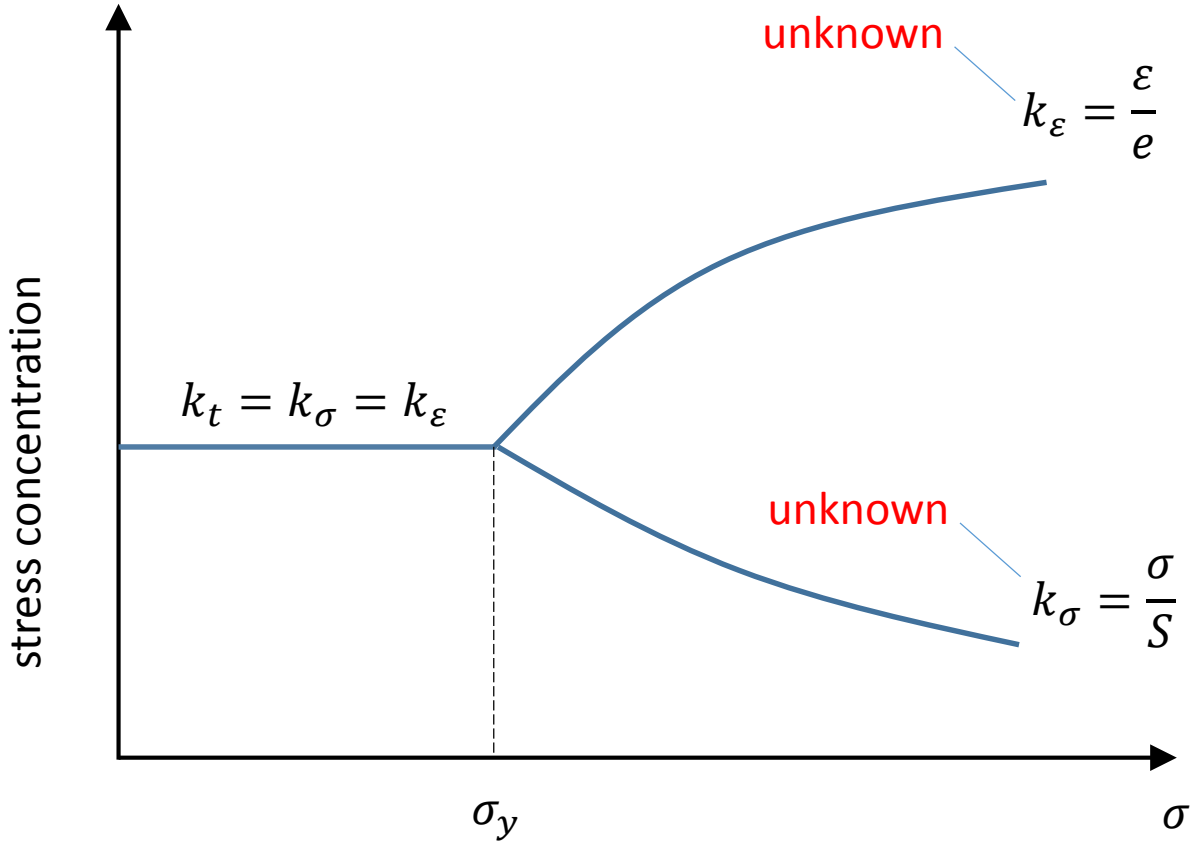
$k_\sigma = \dfrac{\sigma}{S}$

nominal stress $S = \dfrac{P}{(W-d)t}$

nominal strain $e = \dfrac{S}{E}$

needed in strain life approach
- local stress σ
- local strain ε





nominal stress $S = \dfrac{P}{(W-d)t}$

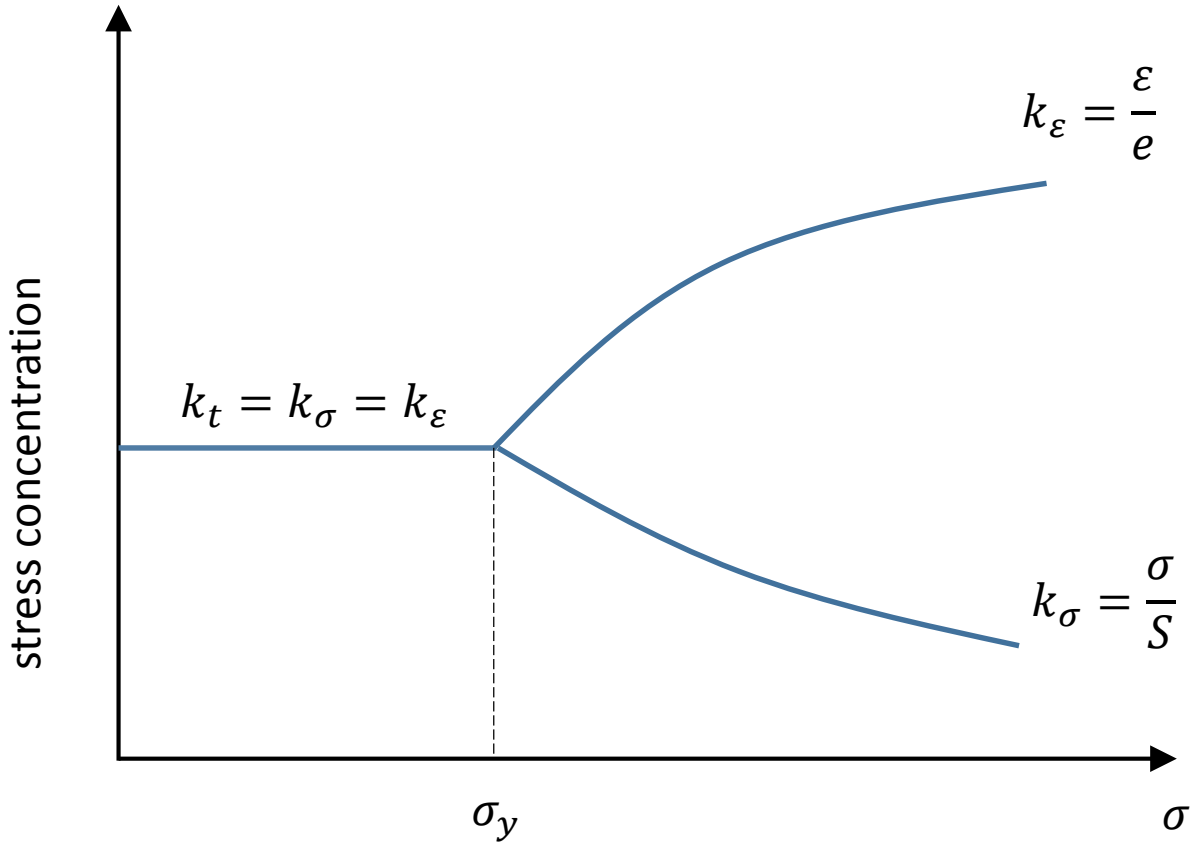
nominal strain $e = \dfrac{S}{E}$

local stress σ

local strain ε

Neuber's rule:

$$\sqrt{k_\sigma k_\varepsilon} = k_t$$



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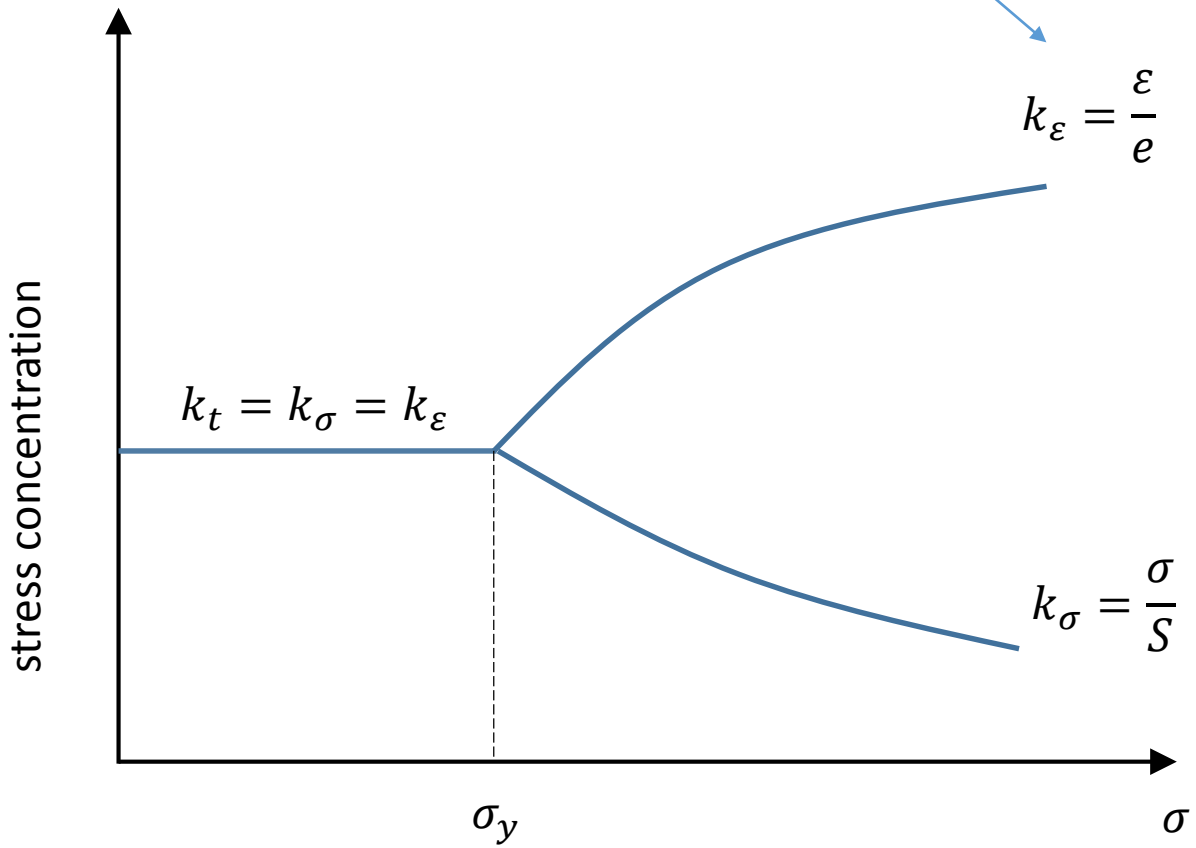

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Neuber's rule:

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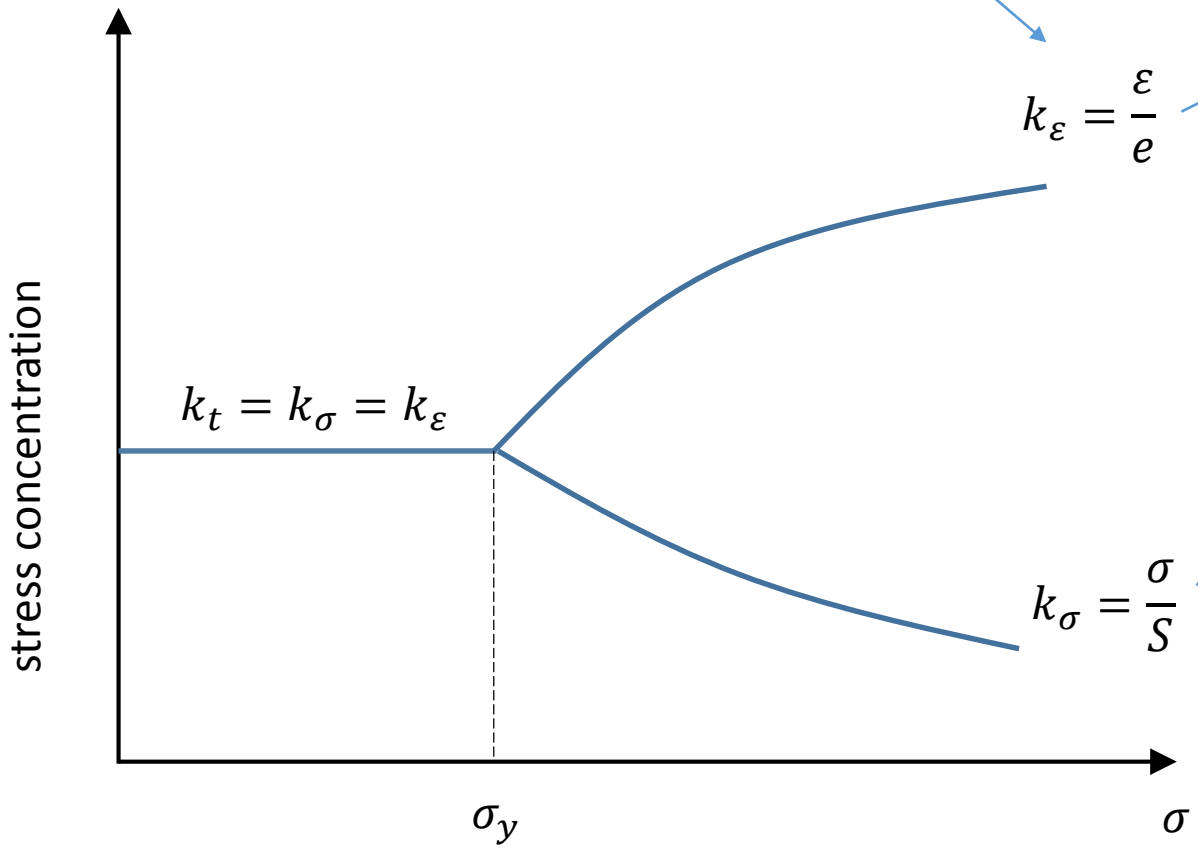
$k_\varepsilon = \dfrac{\varepsilon}{e}$

$k_\sigma = \dfrac{\sigma}{S}$



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local stress σ

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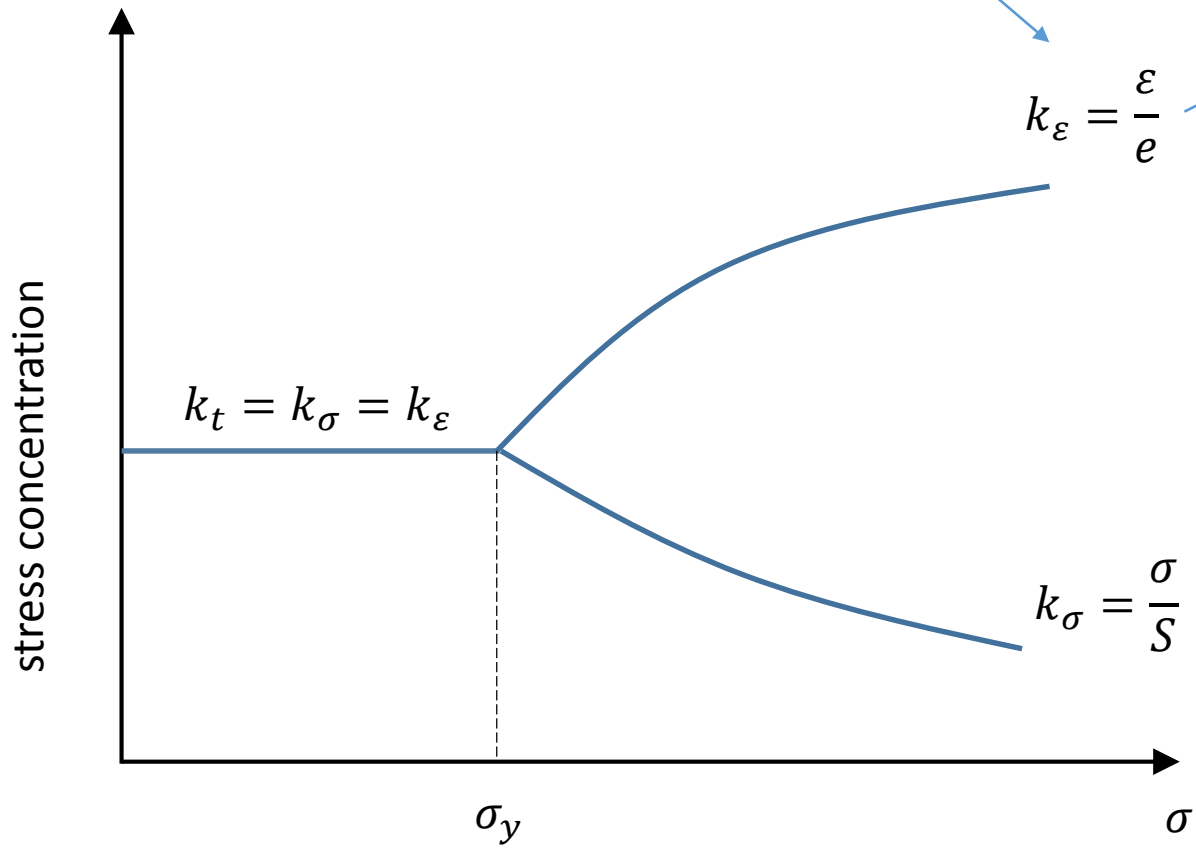
Neuber's rule:

$\sqrt{k_\sigma k_\varepsilon} = k_t$

$\sigma\varepsilon = \dfrac{(S \cdot k_t)^2}{E}$



Neuber's rule:

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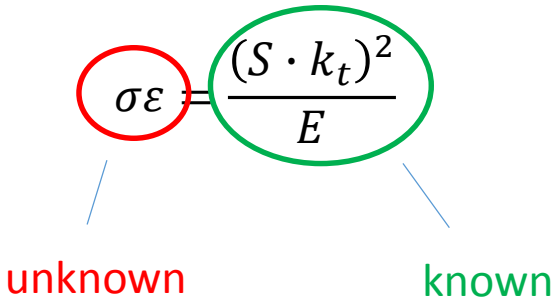
Neuber's rule:



Neuber's rule:

$$\sigma\varepsilon = \frac{(S \cdot k_t)^2}{E}$$

unknown

known

Ramberg-Osgood stress-strain curve

$$\varepsilon = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$$

Neuber's rule:

$$\sigma\varepsilon = \frac{(S \cdot k_t)^2}{E}$$

unknown

known

Ramberg-Osgood stress-strain curve

$$\varepsilon = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$$

$$\frac{\sigma^2}{E} + \sigma\left(\frac{\sigma}{K}\right)^{1/n} = \frac{(S \cdot k_t)^2}{E}$$

σ is only unknown, can be solved numerically

Neuber's rule:

$$\sigma\varepsilon = \frac{(S \cdot k_t)^2}{E}$$

unknown

known

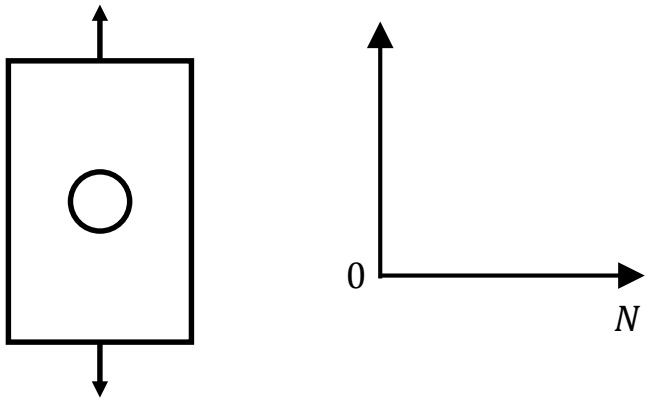
Ramberg-Osgood stress-strain curve

$$\varepsilon = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$$

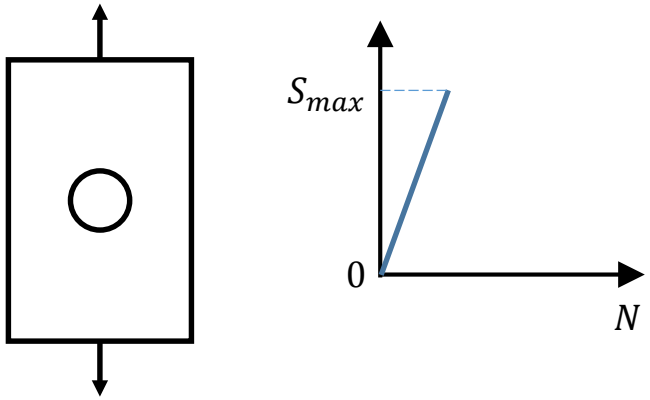
$$\frac{\sigma^2}{E} + \sigma\left(\frac{\sigma}{K}\right)^{1/n} = \frac{(S \cdot k_t)^2}{E}$$

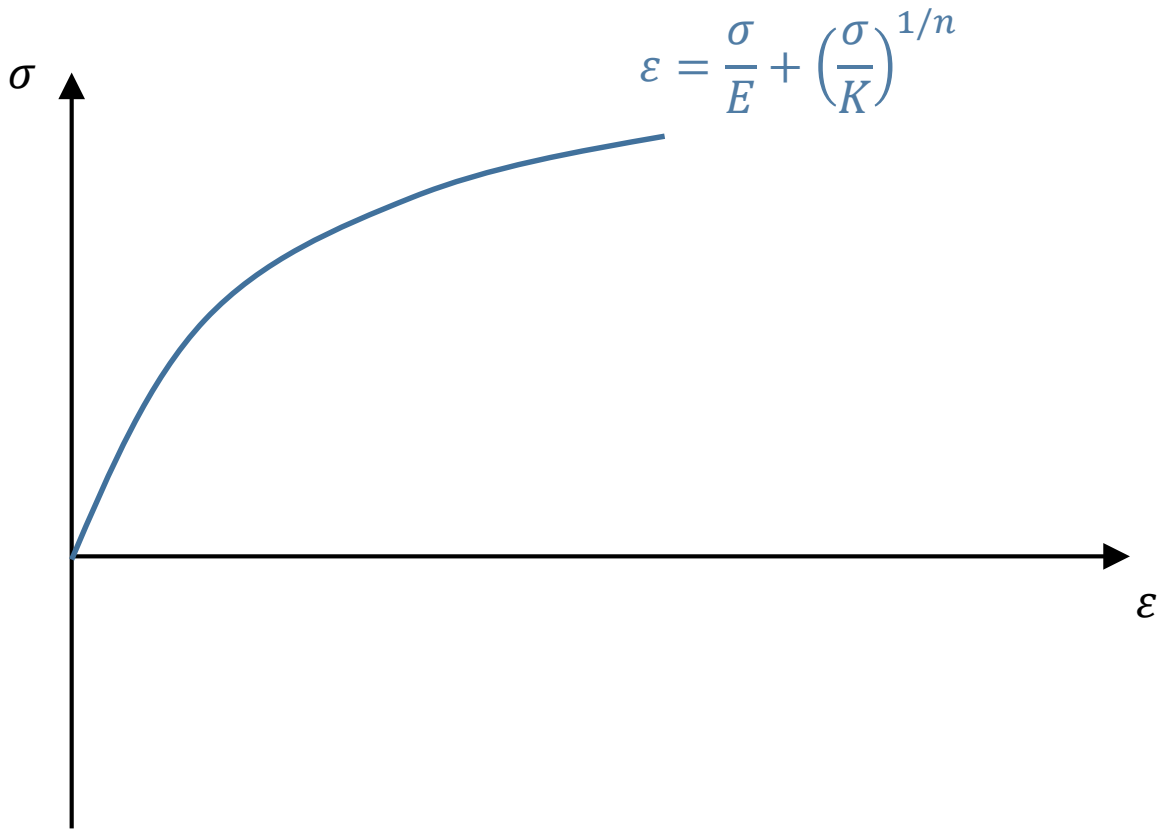
ε can be solved by substituting σ

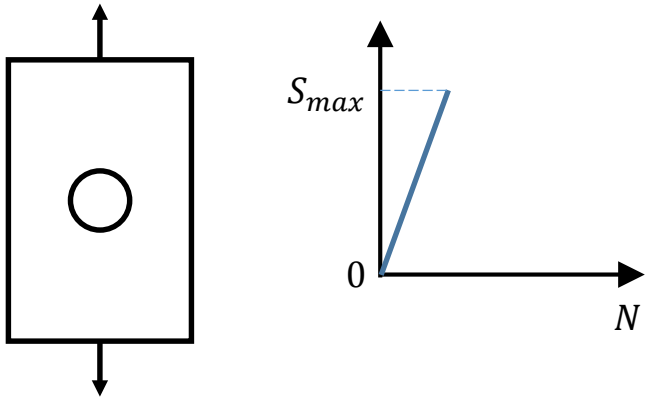
σ is only unknown, can be solved numerically

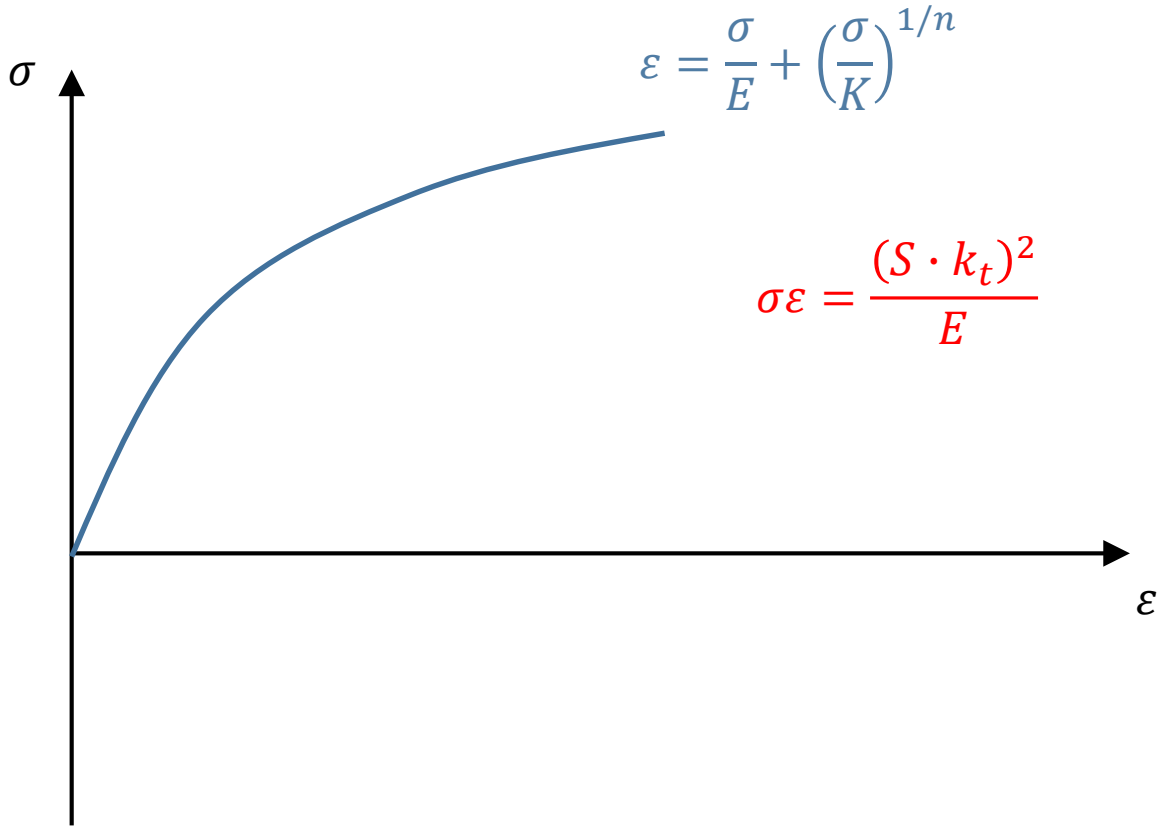

0
N


σ
ε


S_{max}
0
N

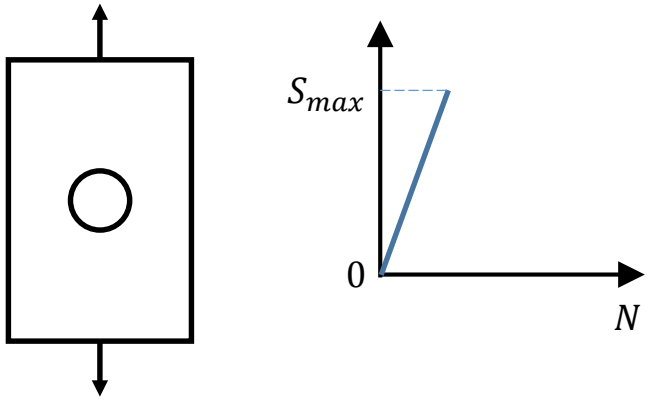

σ
$\varepsilon = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$
ε

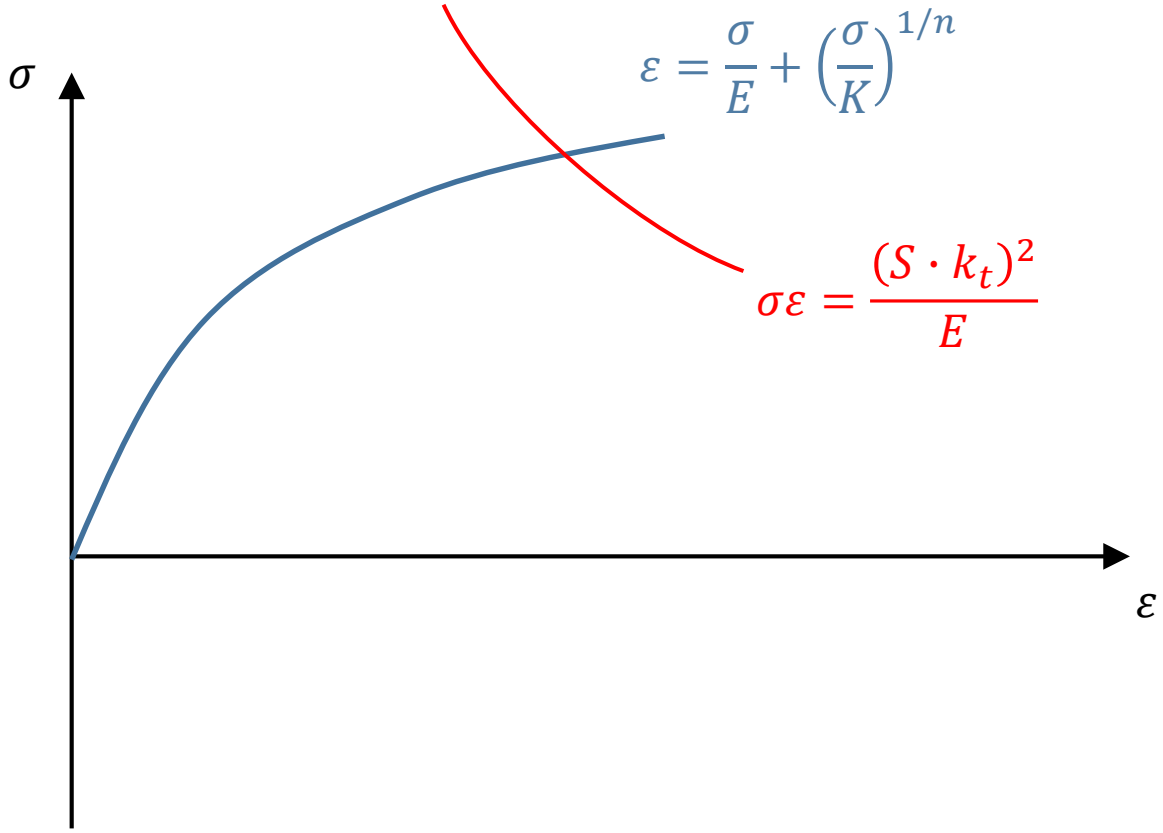


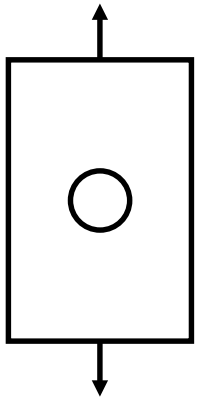


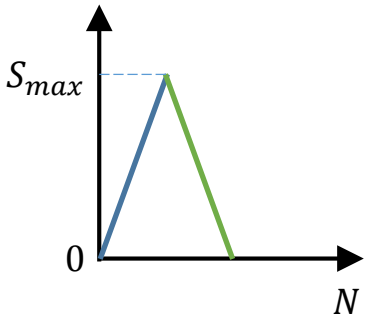
$$\varepsilon = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$$

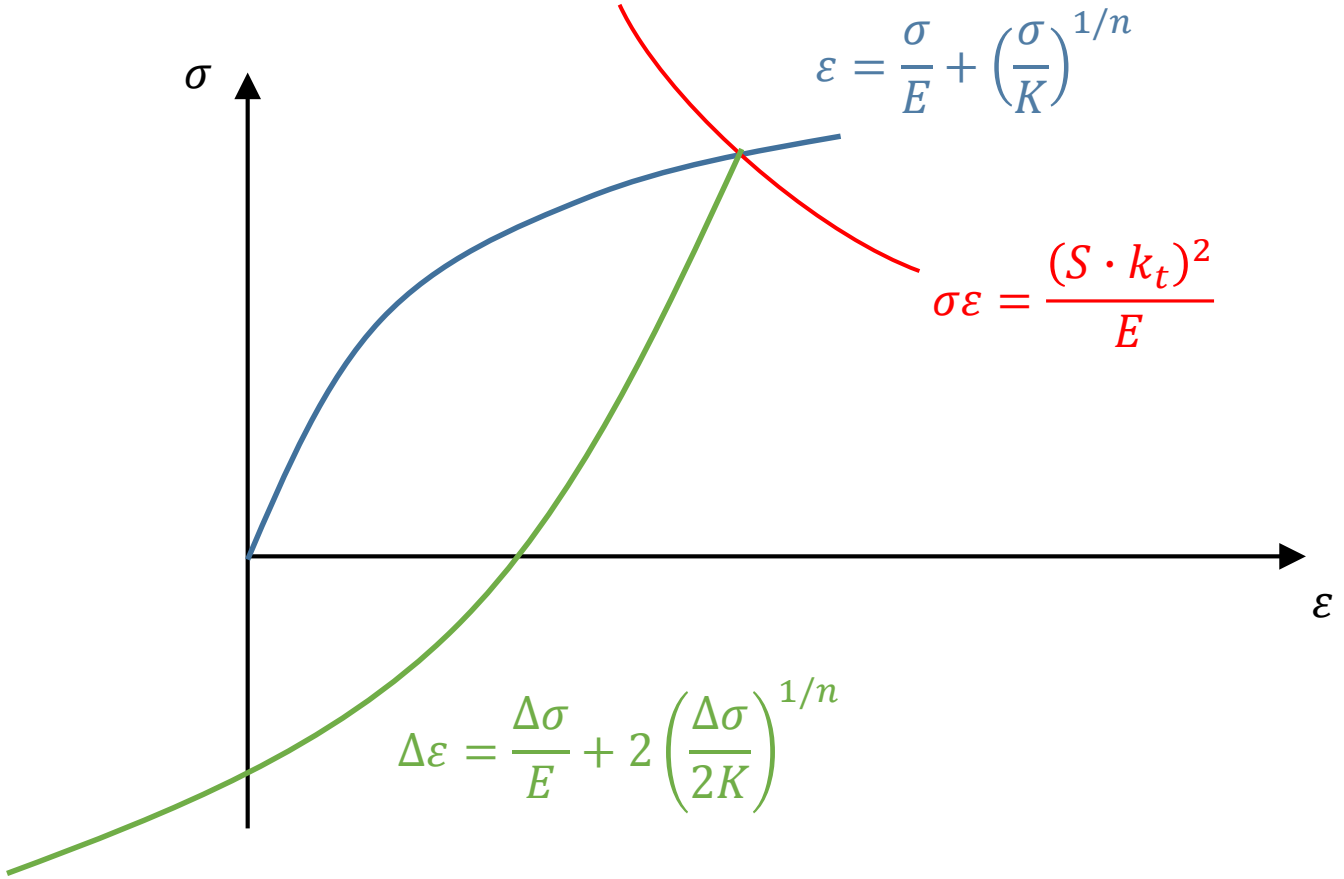
$$\sigma\varepsilon = \frac{(S \cdot k_t)^2}{E}$$

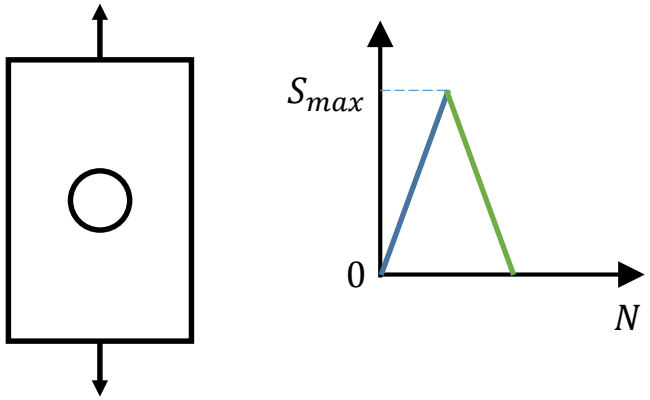

S_{max}
0
N

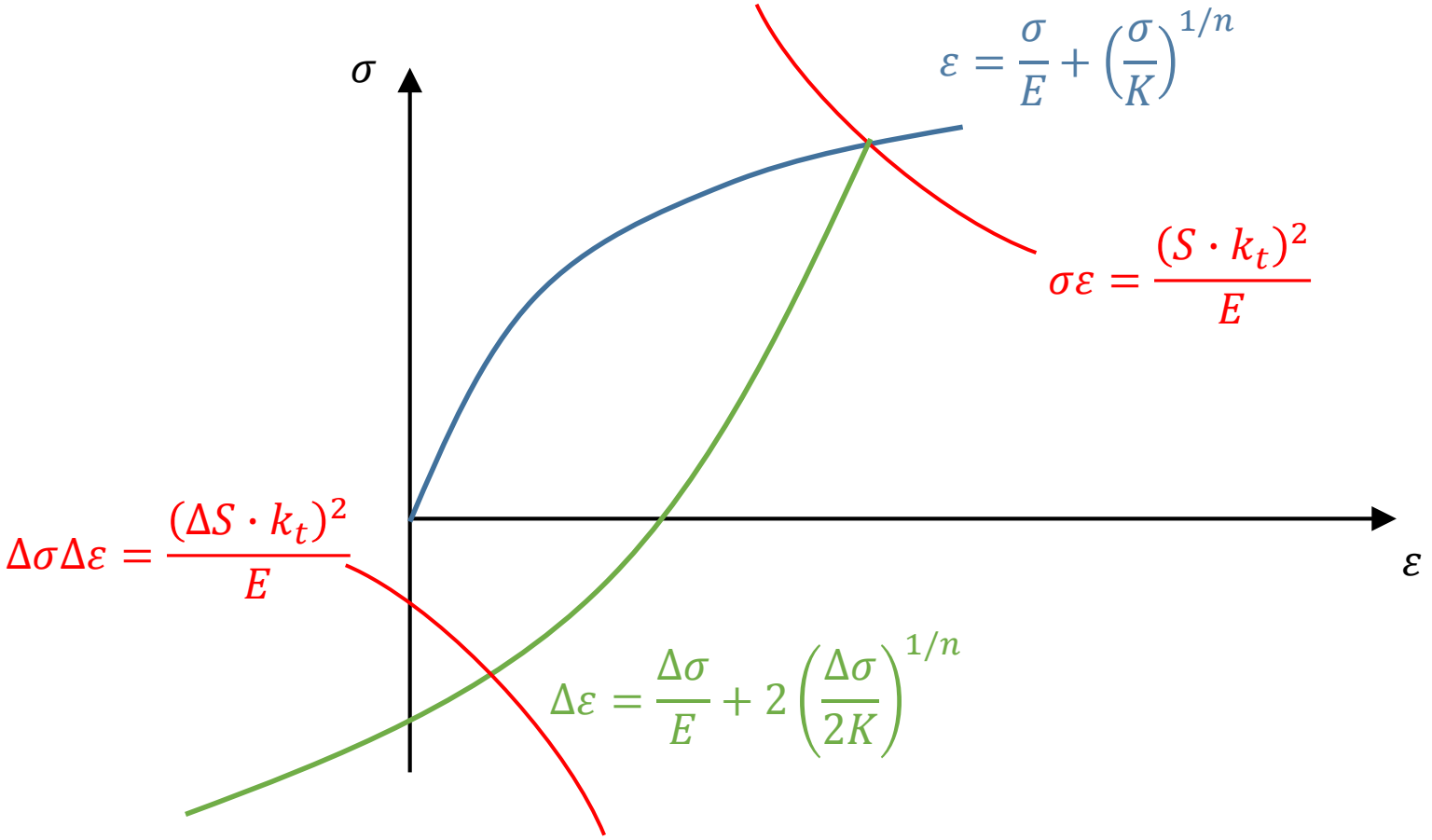

σ
$\varepsilon = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$
$\sigma\varepsilon = \frac{(S \cdot k_t)^2}{E}$
ε

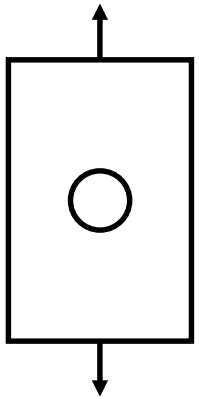


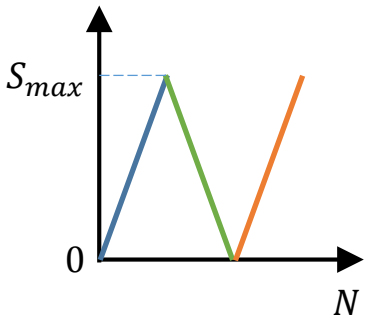

S_{max}
0
N

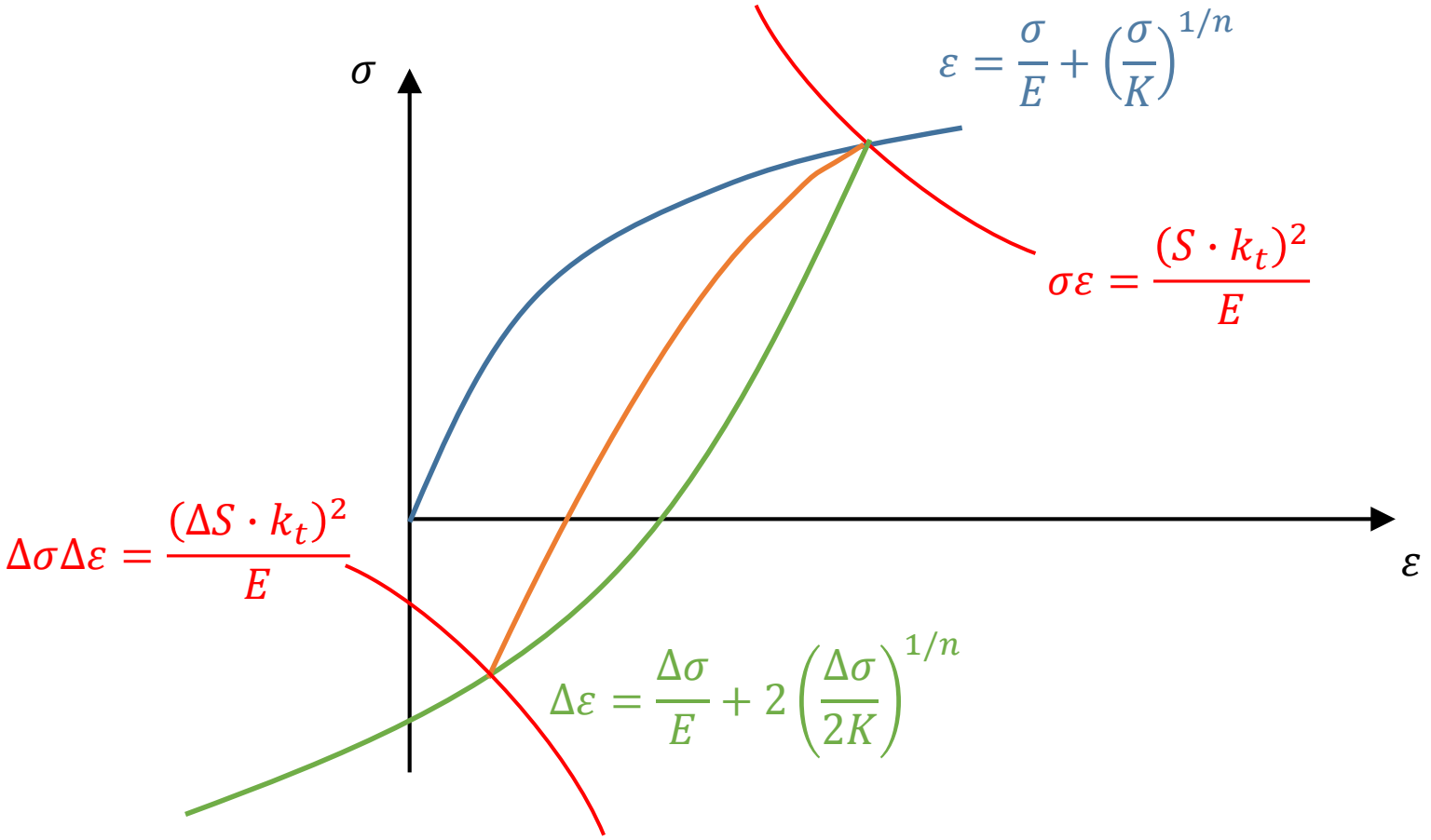

σ
ε
$\varepsilon = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$
$\sigma\varepsilon = \frac{(S \cdot k_t)^2}{E}$
$\Delta\varepsilon = \frac{\Delta\sigma}{E} + 2\left(\frac{\Delta\sigma}{2K}\right)^{1/n}$

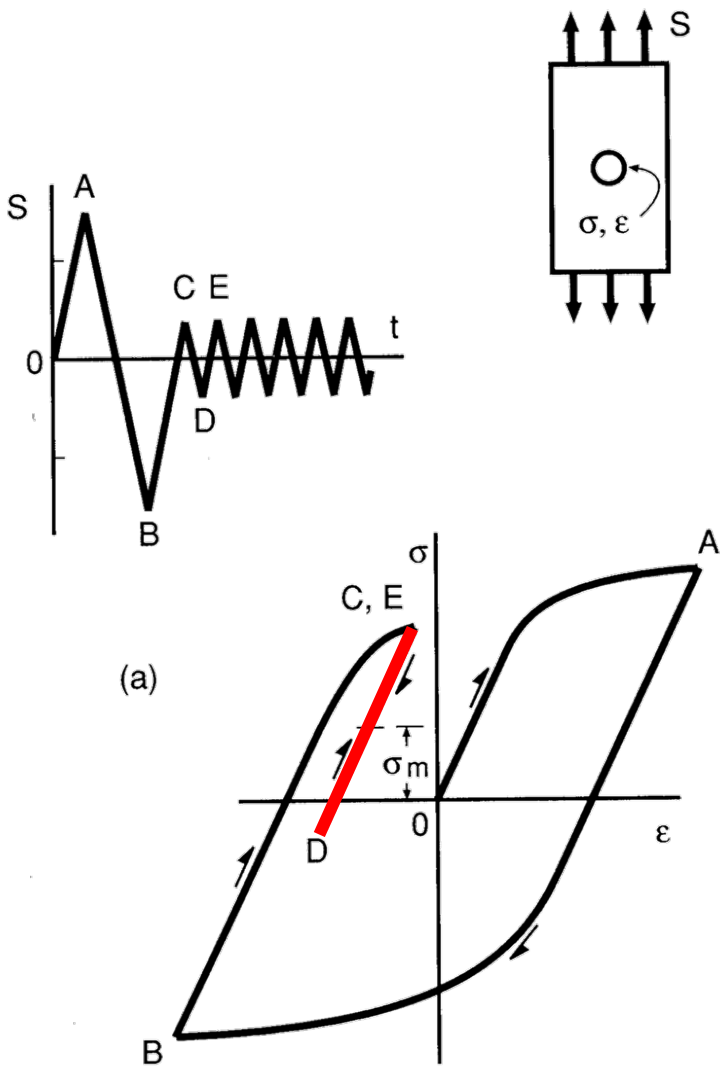

S_{max}
0
N


σ
ε
$\varepsilon = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$
$\sigma\varepsilon = \frac{(S \cdot k_t)^2}{E}$
$\Delta\sigma\Delta\varepsilon = \frac{(\Delta S \cdot k_t)^2}{E}$
$\Delta\varepsilon = \frac{\Delta\sigma}{E} + 2\left(\frac{\Delta\sigma}{2K}\right)^{1/n}$

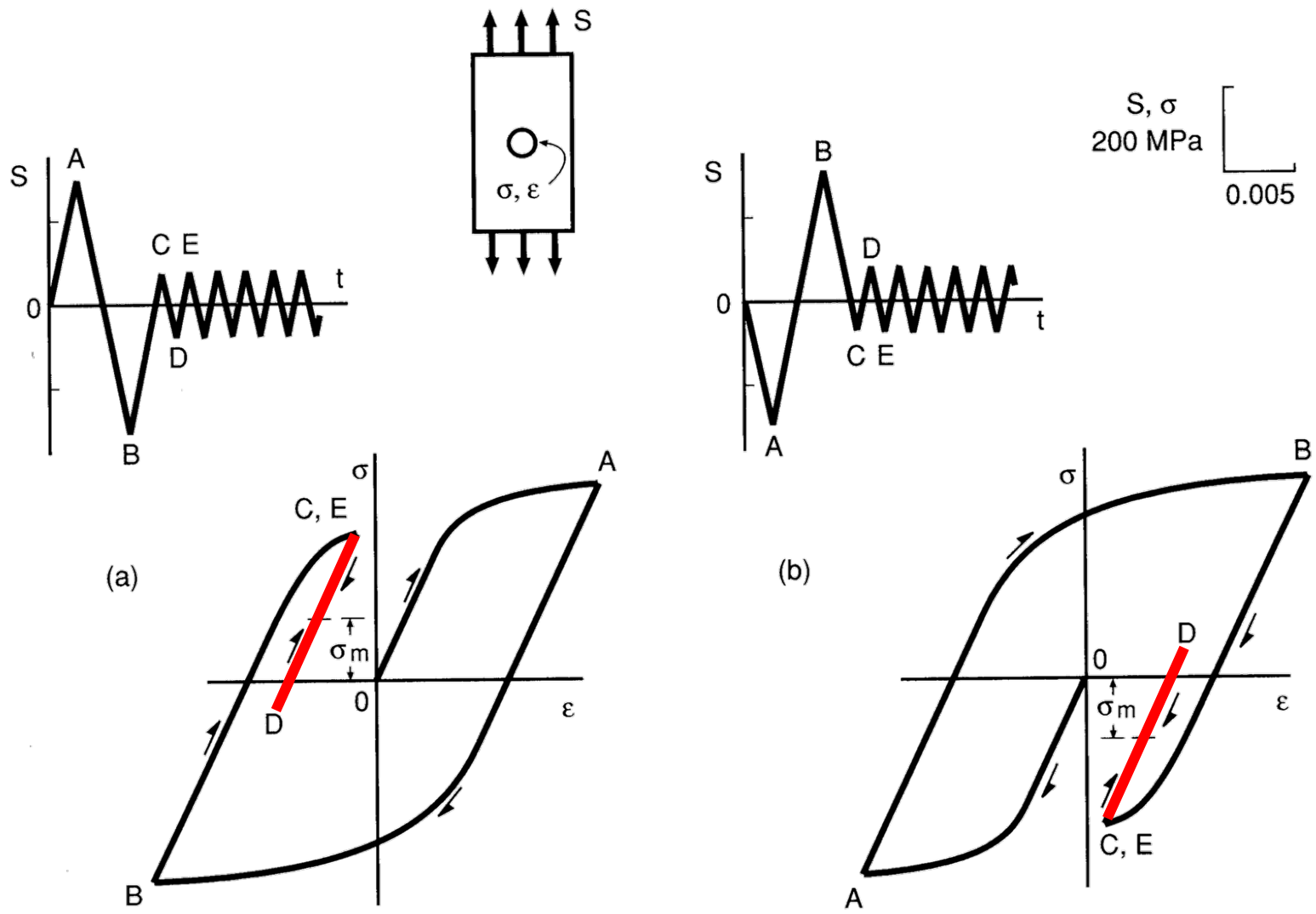



S_{max}
0
N


σ
ε
$\varepsilon = \frac{\sigma}{E} + \left(\frac{\sigma}{K}\right)^{1/n}$
$\sigma\varepsilon = \frac{(S \cdot k_t)^2}{E}$
$\Delta\sigma\Delta\varepsilon = \frac{(\Delta S \cdot k_t)^2}{E}$
$\Delta\varepsilon = \frac{\Delta\sigma}{E} + 2\left(\frac{\Delta\sigma}{2K}\right)^{1/n}$



S, σ
200 MPa
0.005


S
σ, ε
S
A
C E
t
0
D
B
(a)
σ
A
C, E
σm
D
0
ε
B
S, σ
200 MPa
0.005
S
B
D
t
0
C E
A
(b)
σ
B
D
0
σm
ε
C, E
A