

Polypropylene 35°C

24 Feb - 2004

Tensile Creep Compliance

$$D(t) = 1.2 t^{(0.1)} \text{ GPa}^{-1}$$

t is in seconds.

loading

$$\sigma = 0 \text{ for } t < 0$$

$$\sigma = 1 \text{ MPa} \quad 0 \leq t < 1000 \text{ s}$$

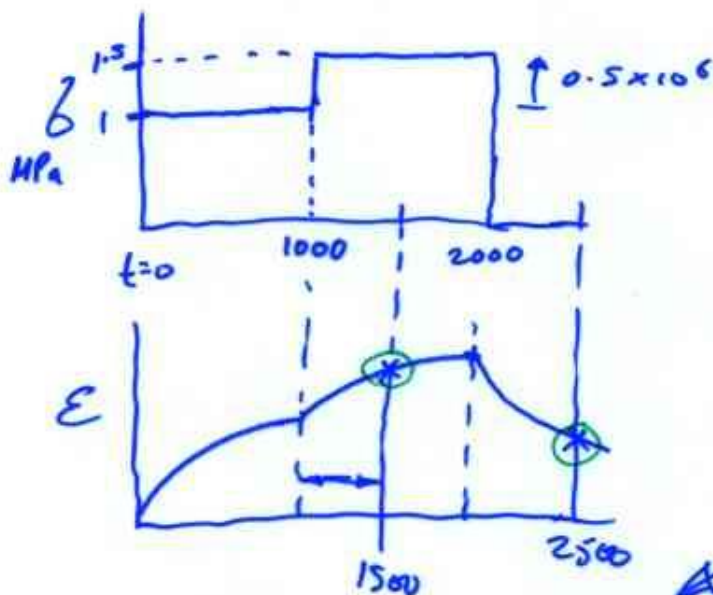
$$\sigma = 1.5 \text{ MPa} \quad 1000 \leq t < 2000 \text{ s}$$

$$\sigma = 0 \quad 2000 \leq t$$

find $\epsilon(t)$

$$t = 1500 \text{ sec}$$

$$t = 2500 \text{ sec.}$$



$$\epsilon(t) = \sum_{i=1}^{\infty} (\Delta\sigma_i) D(t-t_i)$$

$i = -\infty$

$$(a) \epsilon(1500 \text{ s}) = \frac{(1 \times 10^6)}{1 \text{ MPa}} \underbrace{(1.2 \times 10^{-9}) (1500)^{0.1}}_{D(1500)}$$

$$+ (0.5 \times 10^6) (1.2 \times 10^{-9}) (1500 - 1000)^{0.1}$$

$$\epsilon = 3.6 \times 10^{-3} \quad \underline{\underline{0.361 \%}}$$