

Fatigue Problems

For steels we can empirically determine a S-N curve parametrically in terms of the ultimate stress, σ_{ult} , as

$$S = 1.62 \sigma_{ult} N^{-0.085} \quad (10^3 < N < 10^6 \text{ cycles})$$

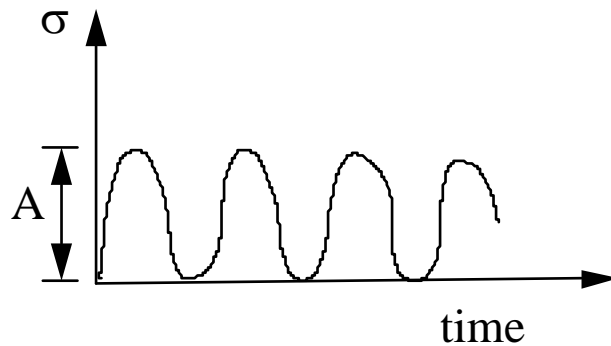
- Given a steel with ultimate, yield, and true fracture stresses given by

$$\sigma_{ult} = 270 \text{ ksi}$$

$$\sigma_{yield} = 250 \text{ ksi}$$

$$\sigma_f = 420 \text{ ksi}$$

determine the allowable stress amplitude, A, for a stress which varies like:



for 10^4 cycles using the Goodman, Gerber, and Morrow curves.

- A component made of steel undergoes a cyclic stress from 75 ksi to -5 ksi. If $\sigma_{ult} = 100$ ksi, estimate the component's life based on the Goodman curve.