

## Appendix A    References

Cook, Robert D., Malkus, David S., Plesha, Michael E. and Witt, Robert J.. Concepts and Applications of Finite Element Analysis, 4th Edition. 4 : Wiley, 2001.

Whitney, Thomas. Finite Element Analysis I - AEE 546 Lectures, Fall 2022.

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## Appendix B Safety Factor Calculation

The Gerber equation with safety factors included:

$$\frac{n_s \sigma_{cyc}}{\sigma_e} + \left( \frac{n_s \sigma_{mean}}{\sigma_y} \right)^2 = 1$$

From the redesigned part:

$$\sigma_{cyc} = 28.29 \text{ MPa}$$

$$\sigma_e = 30 \text{ MPa}$$

$$\sigma_{mean} = 11.62 \text{ MPa}$$

$$\sigma_y = 75 \text{ MPa}$$

Substituting in and generating a quadratic in terms of  $n_s$ :

$$0.9463n_s + 0.024n_s^2 = 1$$

Solving for the positive value of  $n_s$ :

$$n_s = 1.02984$$