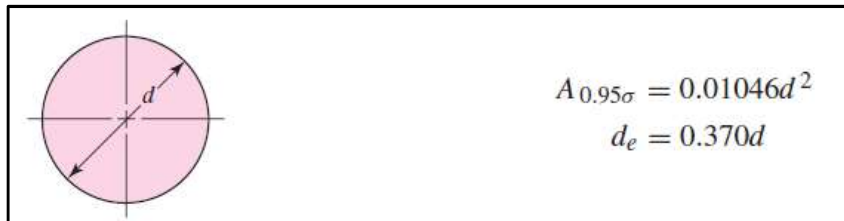


Homework 03

Question 01 (20 points)

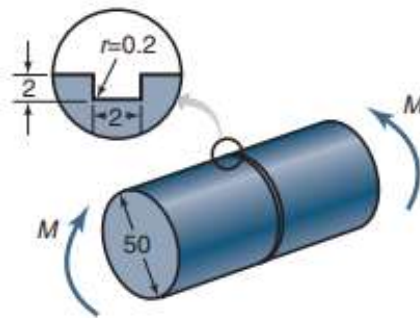
Table 6-3 states that effective diameter d_e of a nonrotating bar is $0.370d$. Use 95 critical stress area method to validate this effective diameter.



Question 02 (40 points)

A rotating round shaft with a flat groove used to seat a retaining ring is shown in the figure below. AISI 1020 steel (quenched and tempered at 870°C) is used for the shaft, which is machined to its final dimensions. Endurance limit of the AISI 1020 steel is 200 MPa and ultimate strength is 395 MPa.

- Estimate the modified endurance limit for the shaft if the shaft is operating under room temperature.
- Calculate the allowable bending moment using a safety factor of 5.0. Use a reliability of 99% and no thermal or miscellaneous effects.



Question 03 (40 points)

Calculate endurance limits and modification factors of a non-rotating rectangular cross section (width=40 mm, height=60mm). The beam is subjected to fully-reversed bending moment. As in Question 02, use AISI 1020 steel with a reliability of 99%, and no thermal or miscellaneous effects.