22.314J – Spring 2004

Problem Set IV

Due 3/9/04

For the geometry and thermal conditions of Problem #III, find out the maximum allowable pressure of the coolant so as not to cause elastic failure under expected static loading and fatigue conditions. State the criterion you wish to apply before proceeding to numerical evaluation.

USEFUL DATA FOR THE STEEL

- Yield Stress = 320 Mpa
- S – N curves for both high cycle fatigue and low cycle fatigue are attached
- Expected number of cycles between cold and hot zero power conditions = 500
- Expected number of cycles between hot-zero power and hot-full power conditions = 10^5

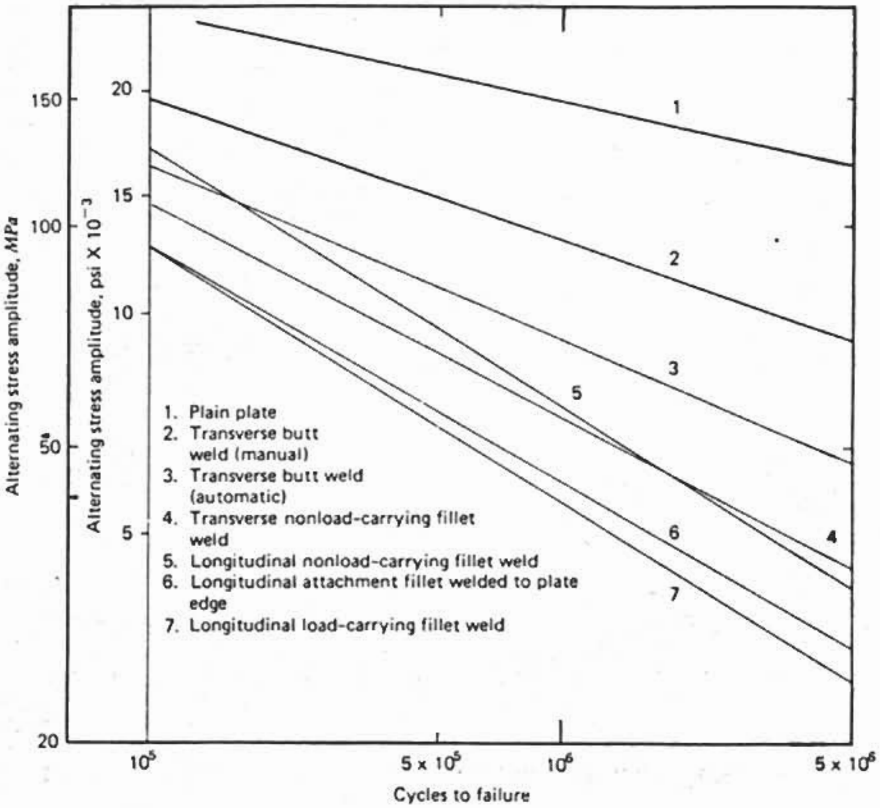

Fig1: high-cycle fatigue

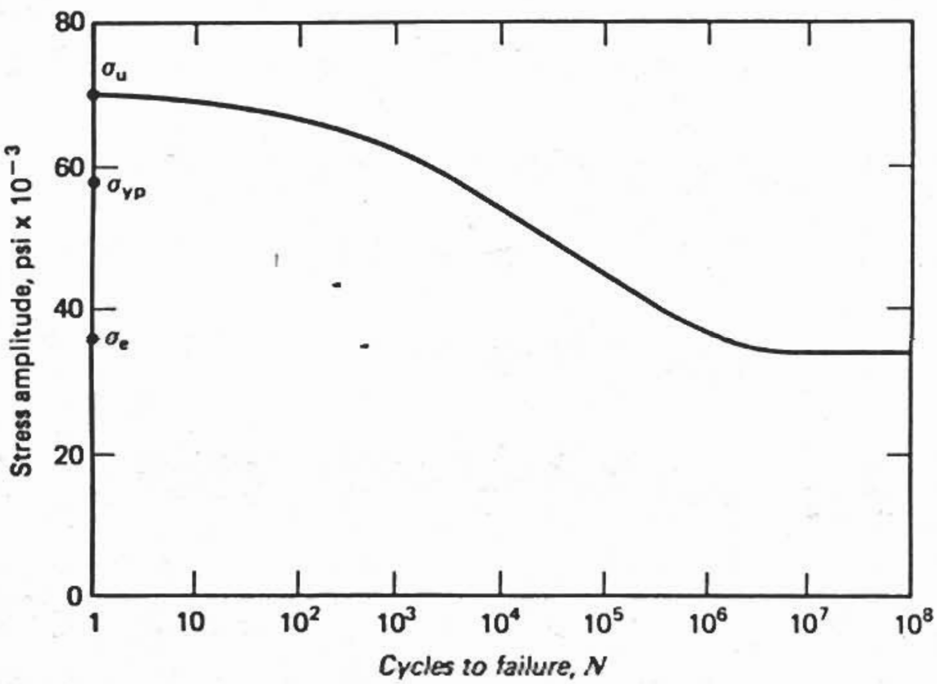

Fig2: low-cycle fatigue