Fracture Mechanics ME 6104 **National University of Singapore**

Prof. M. Perl **Dept. of Mechanical Engineering**

Assignment # 5

Problem 1

The following data was obtained from fatigue crack growth rate tests:

For $\Delta K = 8\,MPa\sqrt{m}$ $\frac{da}{dN} = 10^{-8}\,m/cycle$

and for $\Delta K = 30\,MPa\sqrt{m}$ $\frac{da}{dN} = 4x10^{-6}\,m/cycle$

(a) Determine Paris' constants for this material.

(b) Express the experimental data in British units (ksi and in.) and recalculate Paris' constants.

Problem 2

In class we solved an example problem of evaluating fatigue life under variable amplitude load fluctuation (see Figs 10.5-10.7).

(a) Resolve the problem for the first two blocks of cycles:
   1. with linear crack growth integration and
   2. with crack growth integration with retardation.

(b) Add a third block to the two solutions.

(c) What are your conclusions at the end of the third block?