

CVEN 7511 - Fall 2001

Computational Mechanics of Solids and Structures

Homework # 1

Effect of Elastic Damage :

Problem # 1:

Consider the serial arrangement of three axial force members made up of two node simplex bar elements. Assuming infinitesimal deformations examine the case of element erosion, when the intermediate stiffness is degrading according to the elastic damage concept where $E_s = (1 - d)E_o$. Examine the global force-axial displacement response for $0 \leq d \leq 2$ when the right end of the bar assembly is extended in displacement control, while the left end is constrained. Compare the global response to the stress-strain response of the three members.

Problem # 2:

Extend the previous study of three bar elements in series to a parallel arrangement in which the center bar is subjected to progressive degradation, $0 \leq d \leq 2$. For definiteness assume that $A = 1 \text{ in}^2$, $L = 10 \text{ in}$, $E_o = 30,000 \text{ ksi}$.