MASSACHUSETTS INSTITUTE OF TECHNOLOGY
DEPARTMENT OF OCEAN ENGINEERING AND CIVIL AND ENVIRONMENTAL ENGINEERING
13.10J/1.573J Structural Mechanics
13.014 Materials and Structures
1.052 Mechanics of Structures
Fall 2000
Problem Set 3

Assigned : September 20, 2000
Due : September 27, 2000

1. Problems from Chapter 5, 6 and 16 of the course textbook.
   (a) For undergraduate students (13.014)
      i. 5.3
      ii. 5.38
      iii. 6.19
      iv. 16.10
      v. Determine the stress-strain curve from the raw data obtained from the lab test for the flat steel specimen. Calculate the engineering stress and plot **T-E** curve. Then convert the result into the true stress-logarithmic strain $\sigma - \epsilon$. (Use convertion formulae from the handouts). Fit the $\sigma - \epsilon$ curve by a power law of the form $\sigma = C\epsilon^m$. You may like to use MATLAB in this problem and we will email you a file that contains the above raw data.
   (b) Undergraduate students (1.052)
      i. 5.3
      ii. 5.38
      iii. 6.19

iv. 16.10

(c) For graduate students (13.10J/1.573J)

i. 5.3

ii. 5.38

iii. 5.92

iv. 6.5

v. 6.9

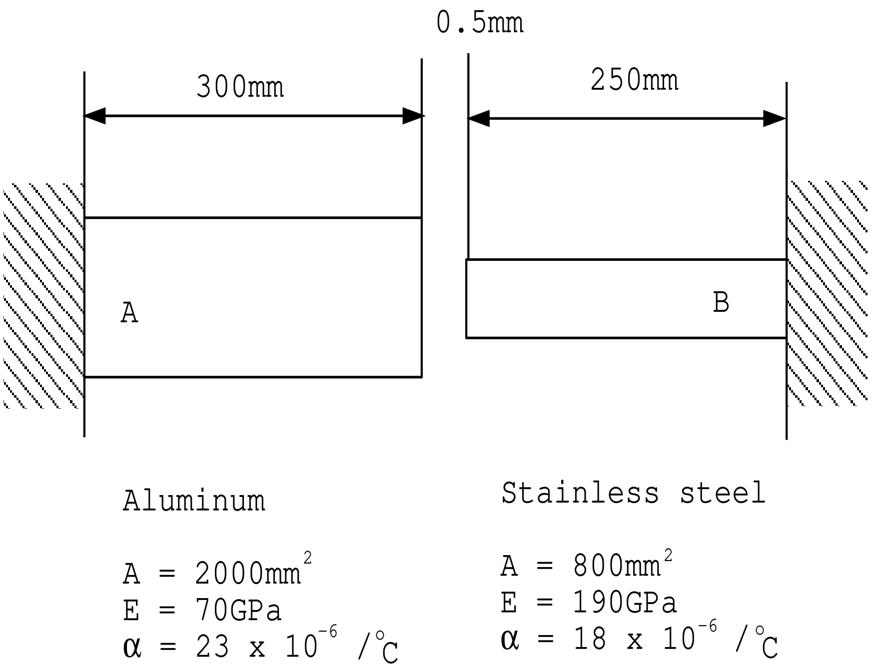
vi. 16.10

2. A supplement problem for graduate students only (13.10J/1.573J)

(a) At room temperature ($20°C$) a 0.5mm gap exists between the ends of the rods shown. At a later time when the temperature reaches $140°C$, determine

i. the normal stress in the aluminum

ii. the length of the aluminum rod.



Problem sets are available also in the course homepage.