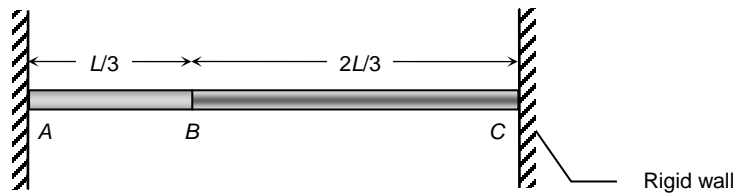


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## Example

Two bars, both with cross sectional areas  $A$ , are attached to rigid walls. Bar  $AB$  is made of aluminum, whereas bar  $BC$  is made of steel. At room temperature the bars are stress-free. In service the temperature of the system rises by an amount  $\Delta T$ .

Assuming  $E_{st} = 3E_{Al}$  and  $\alpha_{st} = \frac{1}{2} \alpha_{Al}$ , does point  $B$  move when heated by  $\Delta T$ ? If so, in which direction and how far?



## Example

The structure shown in the figure consists of one cold-rolled bronze ( $E_b = 15 \times 10^3$  ksi,  $\alpha_b = 9.4 \times 10^{-6}/^\circ\text{F}$ ) bar  $A$  and two 0.2% carbon-hardened steel ( $E_s = 30 \times 10^3$  ksi,  $\alpha_s = 6.6 \times 10^{-6}/^\circ\text{F}$ ) bars  $B$ . A load  $P=200$  kips is applied to point  $C$  while bar  $A$  experiences a temperature decrease  $\Delta T_A = 50^\circ\text{F}$  and both bars  $B$  experience a temperature increase  $\Delta T_B = 30^\circ\text{F}$ . If the cross sectional areas of bars  $A$  and  $B$  are  $A_b = 3.00$  in<sup>2</sup> and  $A_s = 2.50$  in<sup>2</sup>, respectively,

- find the stress in each bar, and
- find the displacement of point  $C$ .

