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Problems

11.1 Evaluate the matrix $\underline{B}$ for the tetrahedral solid element shown in Figure P11–1.

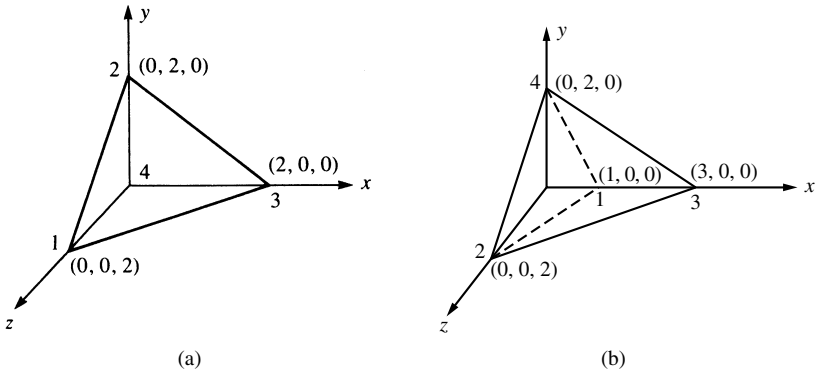

Figure P11–1

11.2 Evaluate the stiffness matrix for the elements shown in Figure P11–1. Let $E = 30 \times 10^6$ psi and $\nu = 0.3$.

11.3 For the element shown in Figure P11–1, assume the nodal displacements have been determined to be

$$\begin{aligned} u_1 &= 0.005 \text{ in.} & v_1 &= 0.0 & w_1 &= 0.0 \\ u_2 &= 0.001 \text{ in.} & v_2 &= 0.0 & w_2 &= 0.001 \text{ in.} \\ u_3 &= 0.005 \text{ in.} & v_3 &= 0.0 & w_3 &= 0.0 \\ u_4 &= -0.001 \text{ in.} & v_4 &= 0.0 & w_4 &= 0.005 \text{ in.} \end{aligned}$$

Determine the strains and then the stresses in the element. Let $E = 30 \times 10^6$ psi and $\nu = 0.3$.

11.4 What is special about the strains and stresses in the tetrahedral element?