Test Problems

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Proposal: Defining test problems at the constitutive level, different material models may be compared systematically in terms of their response behavior. Thereby six different load scenarios are proposed for testing using the coordinate system with $z \rightarrow$ in the out-of-plane direction.

A. Mixed Control

(1) Uniaxial Compression: $\sigma_x = \sigma_z = 0$, $\dot{\epsilon}_y < 0$.

(2) Uniaxial Tension: $\sigma_x = \sigma_z = 0$ $\dot{\epsilon}_y > 0$.

(3) Equibiaxial Tension Compression: $\sigma_z = 0$ $\dot{\epsilon}_x > 0$, $\dot{\epsilon}_y = -\dot{\epsilon}_x$.

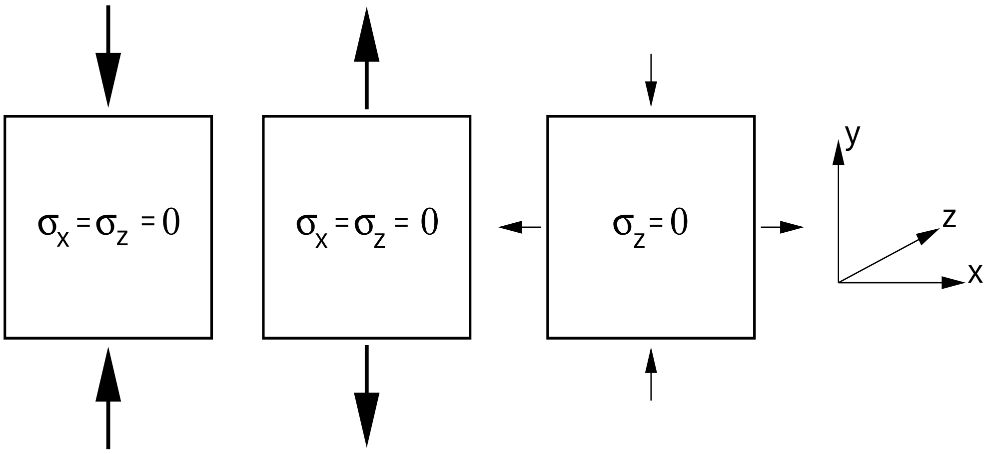


Figure 1 Stress Boundary Conditions in Mixed Control.

B. Strain Control

(1) Axial Compression: $\epsilon_x = \epsilon_z = 0$, $\dot{\epsilon}_y < 0$.

(2) Axial Tension: $\epsilon_x = \epsilon_z = 0$, $\dot{\epsilon}_y > 0$.

(3) Simple Shear: $\epsilon_z = 0$, $\dot{\epsilon}_x > 0$, $\dot{\epsilon}_y = -\dot{\epsilon}_x$.

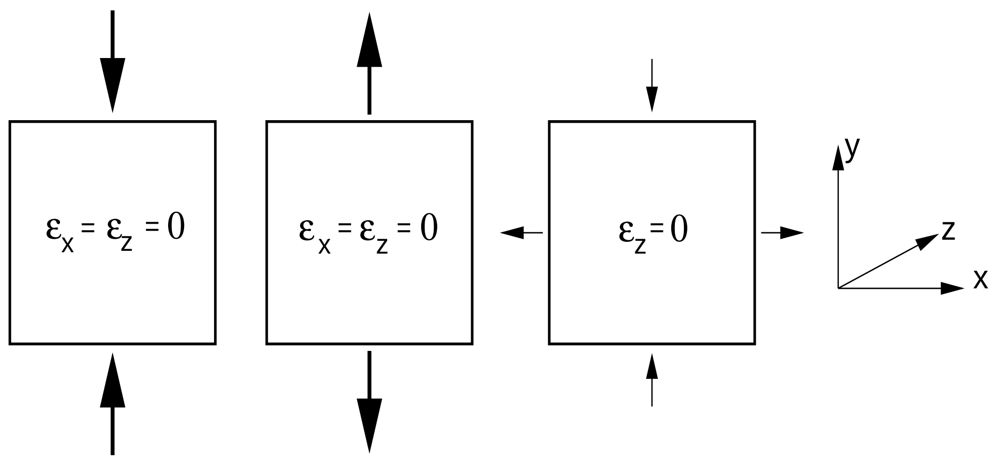
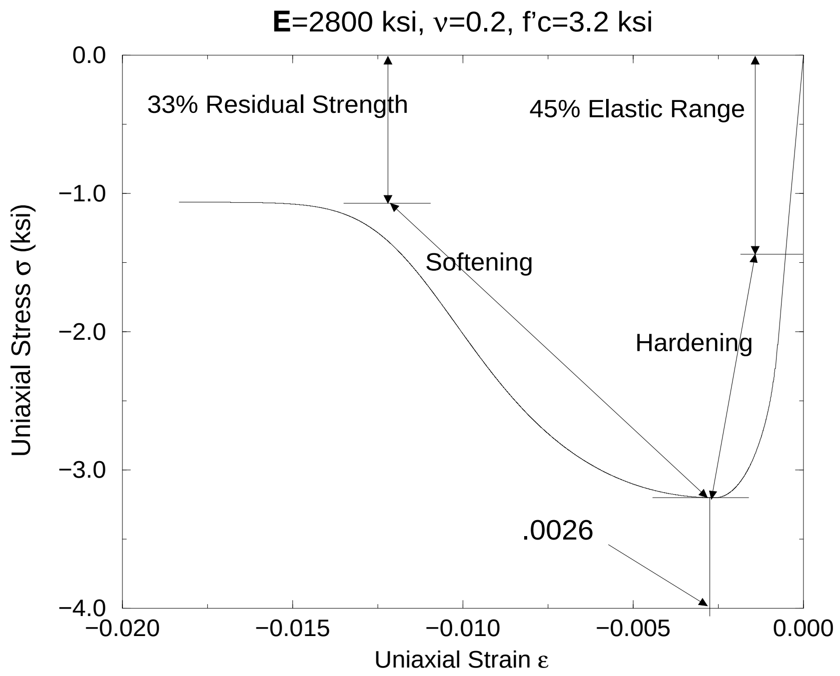


Figure 2 Strain Boundary Conditions in Strain Control.

C. Mixed Control.

1. Uniaxial Compression Response & Material Properties



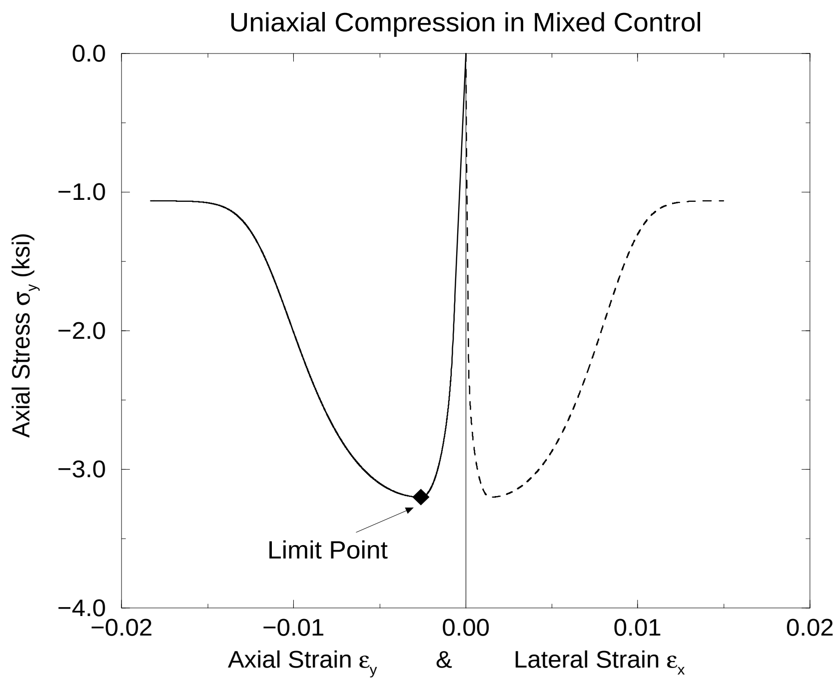


Figure 3 (a) Material Properties and Hardening/Softening Descriptions of Uniaxial Compression. (b) Axial and Lateral Responses of Uniaxial Compression in Triaxial Concrete Model by Kang (1997).

2. Uniaxial Tension Response & Material Properties.

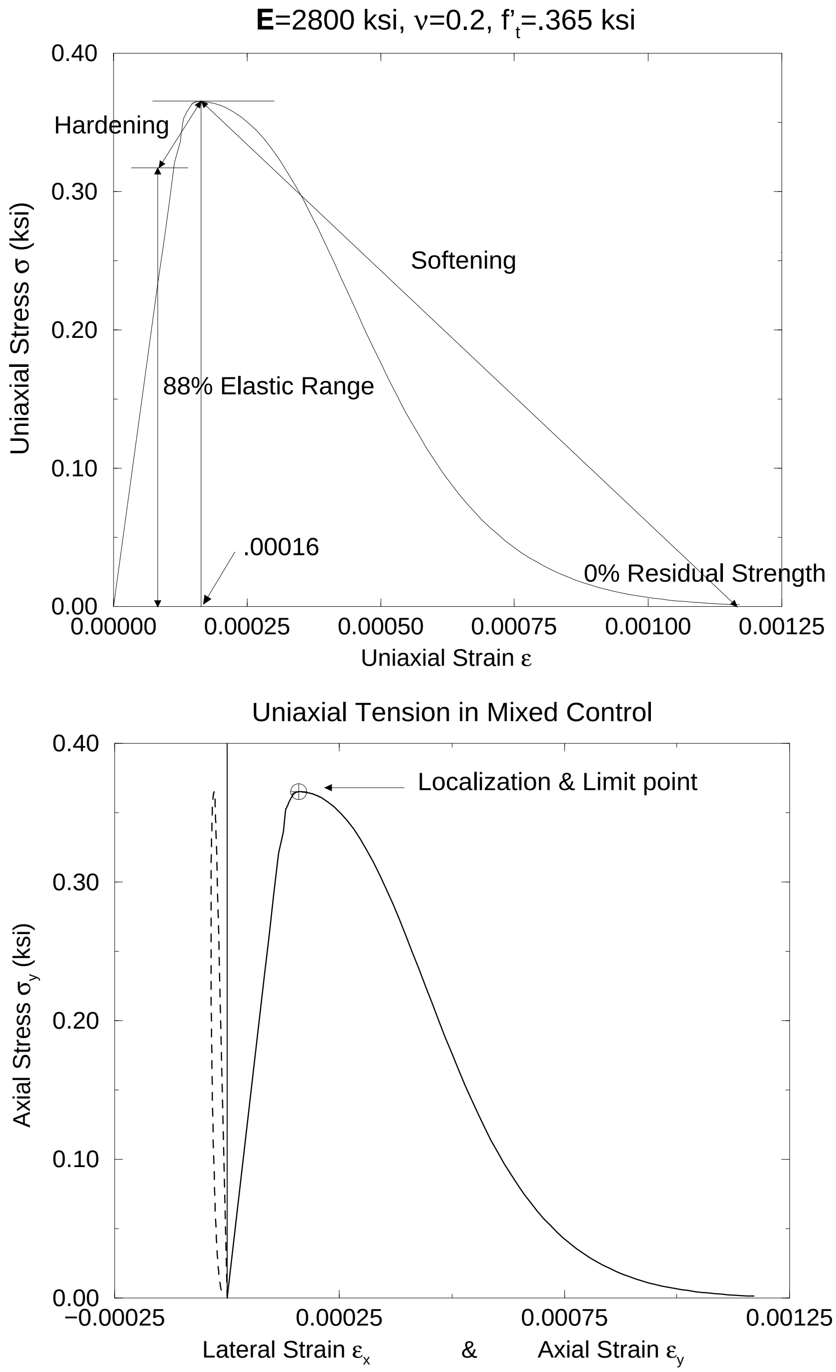
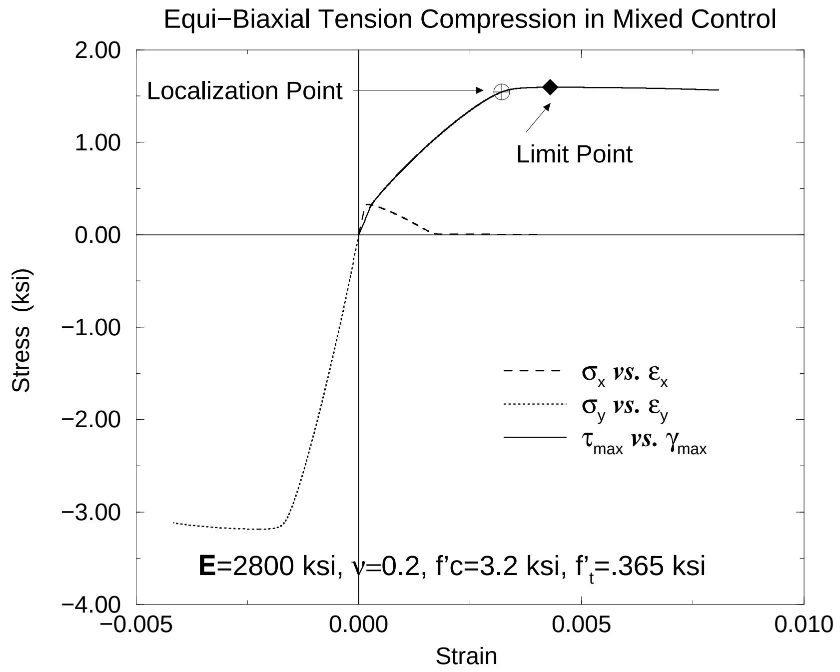


Figure 4 (a) Material Properties and Hardening/Softening Descriptions of Uniaxial Tension. (b) Axial and Lateral Responses of Uniaxial Tension in Triaxial Concrete Model by Kang (1997).

3. Equi-Biaxial T-C Response & Material Properties.



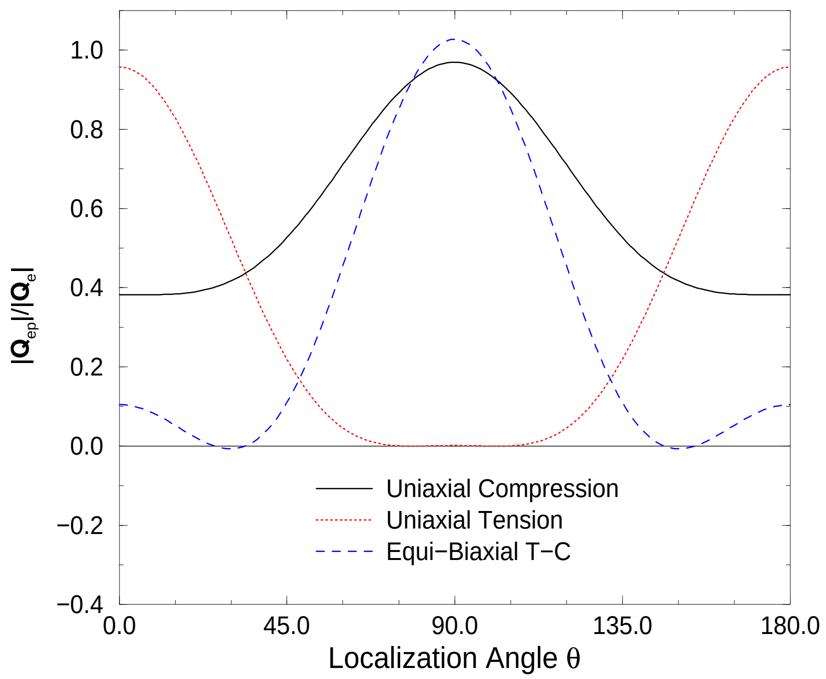


Figure 5 (a) Biaxial and Shear Responses of Equi-Biaxial Tension Compression in Triaxial Concrete Model by Kang (1997). (b) Localization Analysis of Uniaxial Compression, Uniaxial Tension, and Equi-Biaxial T-C.

D. Strain Control.

1. Axial Compression Response & Material Properties

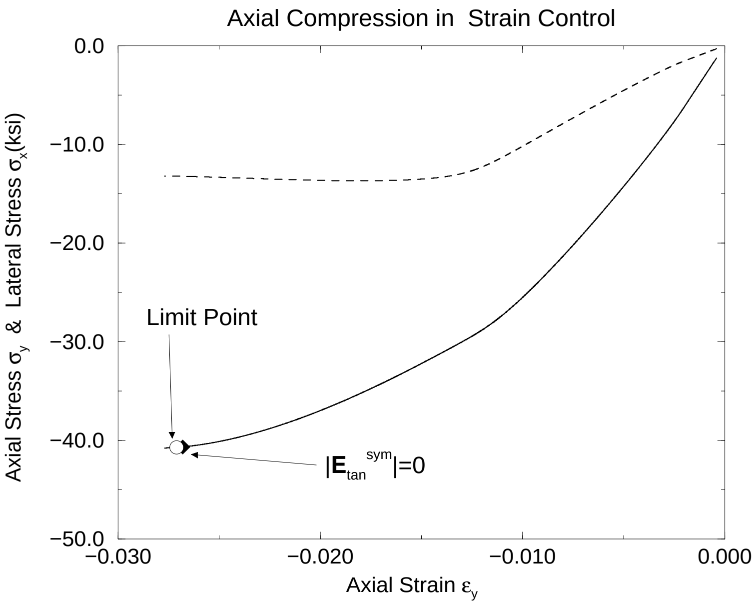


Figure 6 Axial and Lateral Stress Curves of Strain Controlled Axial Compression in Triaxial Concrete Model by Kang (1997).

2. Axial Tension Response & Material Properties.

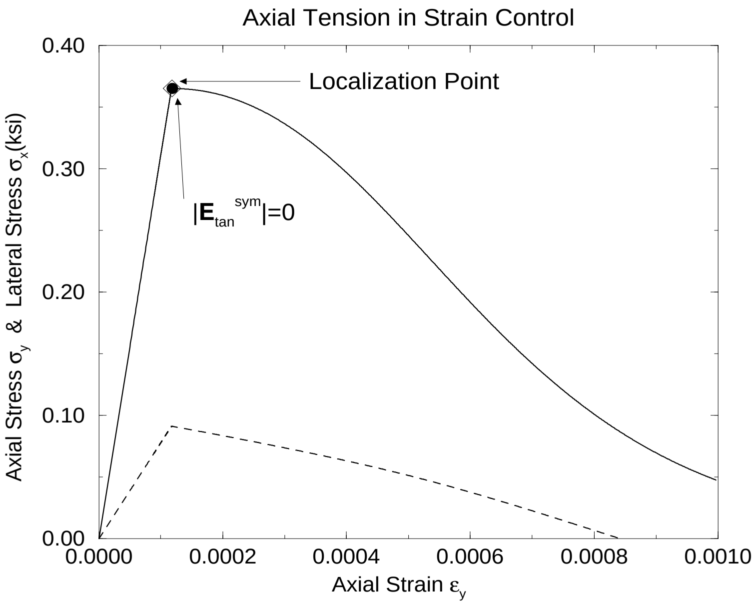


Figure 7 Axial and Lateral Stress Curves of Strain Controlled Axial Tension in Triaxial Concrete Model by Kang (1997).

3. Strain Controlled Equi-Biaxial T-C Response & Material Properties.

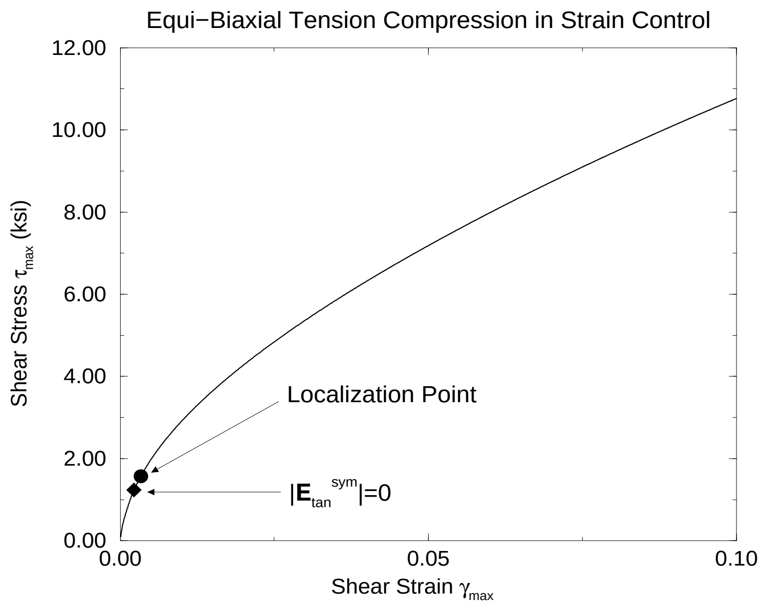


Figure 8 Shear Responses of Strain Controlled Equi-Biaxial Tension Compression in Triaxial Concrete Model by Kang (1997).

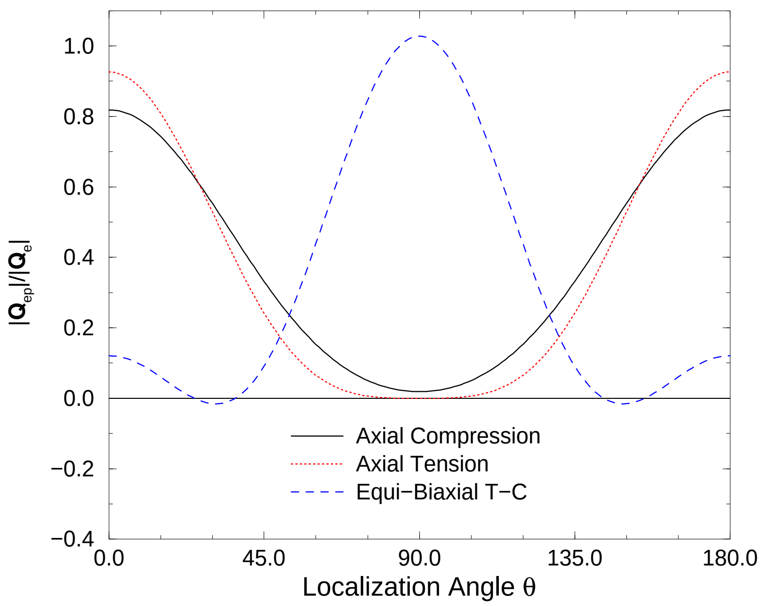


Figure 9 Localization Analysis of Axial Compression, Axial Tension, and Equi-Biaxial T-C in Strain Control.