

木造耐力壁のブレース置換

$$P = K_{\text{壁}} \delta, \quad \Delta l = \delta \cos \theta, \quad N = \frac{P}{\cos \theta}, \quad \sigma = \frac{N}{A} = \frac{P}{A} \frac{1}{\cos \theta} = E \epsilon = E \frac{\Delta l}{l} = \frac{E \delta \cos \theta}{l}$$

$$P = \frac{EA \cos^2 \theta}{l} \delta, \quad K_{\text{壁}} = \frac{EA \cos^2 \theta}{l} = \frac{EA \frac{B^2}{B^2 + H^2}}{\sqrt{B^2 + H^2}} = EA \frac{B^2}{(B^2 + H^2)^{\frac{3}{2}}},$$

1/150rad 変形時耐力と等価な剛性を入力する場合、

$$P_{150} = K_{\text{壁}} \frac{H}{150}, \quad K_{\text{壁}} = \frac{150 P_{150}}{H},$$

$$K_{\text{壁}} = \frac{150 P_{150}}{H} = EA \frac{B^2}{(B^2 + H^2)^{\frac{3}{2}}}, \quad A = 150 P_{150} \frac{(B^2 + H^2)^{\frac{3}{2}}}{B^2 H E}$$

$$B = 910 \text{mm}, \quad H = 2730 \text{mm}, \quad E = 9500 \text{N/mm}^2, \quad \text{壁倍率} = 7 \text{倍},$$

$$P_a = 7 \times 1.96 \times 0.910 = 12.5 \text{kN}, \quad A = 150 P_{150} \frac{(B^2 + H^2)^{\frac{3}{2}}}{B^2 H E}$$

$$= 150 \times 12.5 \times 10^3 \times \frac{(910^2 + 2730^2)^{\frac{3}{2}}}{910^2 \cdot 2730 \cdot 9500} = 2080 \text{mm}^2$$

たすき掛け、正方形断面で入力するとき、1辺の長さ =  $\sqrt{2080/2} = 32.2 \text{mm}$

