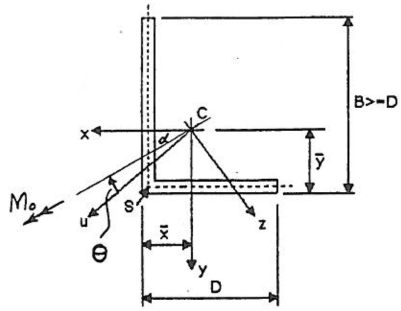

from the Handbook: $\alpha, \bar{x}, \bar{y}, I_x, I_y, r_z, A$

C: centroid $(0,0)$

S: shear center (u_0, z_0)

x,y: non-principal axes

u,z: principal axes

t: thickness of the angle

$$x_o = \bar{x} - \frac{t}{2}$$

$$y_o = \bar{y} - \frac{t}{2}$$

$$I_z = A \cdot r_z^2 \qquad u_o = y_o \cdot \sin(\alpha) + x_o \cdot \cos(\alpha)$$

$$I_u = I_x + I_y - I_z \qquad z_o = y_o \cdot \cos(\alpha) - x_o \cdot \sin(\alpha)$$

$$J = \frac{2 \cdot A \cdot t^2}{3} \qquad d = D - \frac{t}{2}$$

$$r_o^2 = u_o^2 + z_o^2 + \frac{I_u + I_z}{A} \qquad b = B - \frac{t}{2}$$

$$C_1 = \frac{x_o^2}{2} \cdot \left[y_o^2 - (y_o - b)^2\right] + \frac{y_o^4 - (y_o - b)^4}{4} + \frac{y_o}{3} \cdot \left[x_o^3 - (x_o - d)^3\right] - y_o^3 \cdot d$$

$$C_2 = \frac{x_o}{3} \cdot \left[y_o^3 - (y_o - b)^3\right] - x_o^3 \cdot b + \frac{x_o^4 - (x_o - d)^4}{4} + \frac{y_o^2}{2} \cdot \left[x_o^2 - (x_o - d)^2\right]$$

$$\beta_z = \frac{t \cdot \left(C_1 \cdot \sin(\alpha) + C_2 \cdot \cos(\alpha)\right)}{I_z} - 2 \cdot u_o$$

$$\beta_u = \frac{t \cdot \left(C_1 \cdot \cos(\alpha) - C_2 \cdot \sin(\alpha)\right)}{I_u} - 2 \cdot z_o$$

Fig. 11.5 Definition of cross-sectional properties.

2. Compute an equivalent slenderness parameter:

$$\lambda_{eq} = \frac{1}{\pi}\left(\frac{L}{r}\right)_{eq}\sqrt{\frac{F_y}{E}} = \sqrt{\frac{AF_y}{P}} \tag{11.9}$$

3. Determine the buckling load using the formula in Section E2 of the AISC–LRFD specification.

Kitipornchai (1983) suggested the following approximations for the equivalent slenderness ratio from curve-fitting solutions to Equations 11.1 or 11.6: For equal-leg angles;