CODE

where β_{dns} shall be the ratio of maximum factored sustained axial load to maximum factored axial load associated with the same load combination and I in Eq. (6.6.4.4.4c) is calculated according to Table 6.6.3.1.1(b) for columns and walls.

6.6.4.5 *Moment magnification method: Nonsway frames*

6.6.4.5.1 The factored moment used for design of columns and walls, M_c, shall be the first-order factored moment M_2 amplified for the effects of member curvature.

$$M_c = \delta M_2 \tag{6.6.4.5.1}$$

6.6.4.5.2 Magnification factor δ shall be calculated by:

$$\delta = \frac{C_m}{1 - \dfrac{P_u}{0.75P_c}} \geq 1.0 \tag{6.6.4.5.2}$$

6.6.4.5.3 C_m shall be in accordance with (a) or (b):

(a) For columns without transverse loads applied between supports

$$C_m = 0.6 - 0.4\frac{M_1}{M_2} \tag{6.6.4.5.3a}$$

where M_1/M_2 is negative if the column is bent in single curvature, and positive if bent in double curvature. M_1 corresponds to the end moment with the lesser absolute value.

(b) For columns with transverse loads applied between supports.

$$C_m = 1.0 \tag{6.6.4.5.3b}$$

COMMENTARY

simplification, it can be assumed that β_{dns} = **0.6**. In this case, Eq. (6.6.4.4.4a) becomes $(EI)_{eff} = 0.25E_cI_g$.

In reinforced concrete columns subject to sustained loads, creep transfers some of the load from the concrete to the longitudinal reinforcement, increasing the reinforcement stresses. In the case of lightly reinforced columns, this load transfer may cause the compression reinforcement to yield prematurely, resulting in a loss in the effective EI. Accordingly, both the concrete and longitudinal reinforcement terms in Eq. (6.6.4.4.4b) are reduced to account for creep.

R6.6.4.5 *Moment magnification method: Nonsway frames*

R6.6.4.5.2 The 0.75 factor in Eq. (6.6.4.5.2) is the stiffness reduction factor ϕ_K, which is based on the probability of understrength of a single isolated slender column. Studies reported in Mirza et al. (1987) indicate that the stiffness reduction factor ϕ_K and the cross-sectional strength reduction ϕ factors do not have the same values. These studies suggest the stiffness reduction factor ϕ_K for an isolated column should be 0.75 for both tied and spiral columns. In the case of a multistory frame, the column and frame deflections depend on the average concrete strength, which is higher than the strength of the concrete in the critical single understrength column. For this reason, the value of ϕ_K implicit in I values in 6.6.3.1.1 is 0.875.

R6.6.4.5.3 The factor C_m is a correction factor relating the actual moment diagram to an equivalent uniform moment diagram. The derivation of the moment magnifier assumes that the maximum moment is at or near midheight of the column. If the maximum moment occurs at one end of the column, design should be based on an equivalent uniform moment C_mM_2 that leads to the same maximum moment at or near midheight of the column when magnified (MacGregor et al. 1970).

The sign convention for M_1/M_2 has been updated to follow the right hand rule convention; hence, M_1/M_2 is negative if bent in single curvature and positive if bent in double curvature. This reflects a sign convention change from the 2011 Code.

In the case of columns that are subjected to transverse loading between supports, it is possible that the maximum moment will occur at a section away from the end of the member. If this occurs, the value of the largest calculated moment occurring anywhere along the member should be used for the value of M_2 in Eq. (6.6.4.5.1). C_m is to be taken as 1.0 for this case.