CODE

8.4.4.1 *Critical section*

8.4.4.1.1 Slabs shall be evaluated for two-way shear in the vicinity of columns, concentrated loads, and reaction areas at critical sections in accordance with 22.6.4.

8.4.4.1.2 Slabs reinforced with stirrups or headed shear stud reinforcement shall be evaluated for two-way shear at critical sections in accordance with 22.6.4.2.

8.4.4.2 *Factored two-way shear stress due to shear and factored slab moment resisted by the column*

8.4.4.2.1 For two-way shear with factored slab moment resisted by the column, factored shear stress $\boldsymbol{v_u}$ shall be calculated at critical sections in accordance with 8.4.4.1. Factored shear stress $\boldsymbol{v_u}$ corresponds to a combination of $\boldsymbol{v_{uv}}$ and the shear stress produced by $\boldsymbol{\gamma_v M_{sc}}$, where $\boldsymbol{\gamma_v}$ is given in 8.4.4.2.2 and $\boldsymbol{M_{sc}}$ is given in 8.4.2.2.1.

8.4.4.2.2 The fraction of $\boldsymbol{M_{sc}}$ transferred by eccentricity of shear, $\boldsymbol{\gamma_v M_{sc}}$, shall be applied at the centroid of the critical section in accordance with 8.4.4.1, where:

$$\gamma_v = 1 - \gamma_f \qquad (8.4.4.2.2)$$

8.4.4.2.3 The factored shear stress resulting from $\boldsymbol{\gamma_v M_{sc}}$ shall be assumed to vary linearly about the centroid of the critical section in accordance with 8.4.4.1.

COMMENTARY

R8.4.4.2 *Factored two-way shear stress due to shear and factored slab moment resisted by the column*

R8.4.4.2.2 Hanson and Hanson (1968) found that where moment is transferred between a column and a slab, 60 percent of the moment should be considered transferred by flexure across the perimeter of the critical section defined in 22.6.4.1, and 40 percent by eccentricity of the shear about the centroid of the critical section. For rectangular columns, the portion of the moment transferred by flexure increases as the width of the face of the critical section resisting the moment increases, as given by Eq. (8.4.2.2.2).

Most of the data in Hanson and Hanson (1968) were obtained from tests of square columns. Limited information is available for round columns; however, these can be approximated as square columns having the same cross-sectional area.

R8.4.4.2.3 The stress distribution is assumed as illustrated in Fig. R8.4.4.2.3 for an interior or exterior column. The perimeter of the critical section, ***ABCD***, is determined in accordance with 22.6.4.1. The factored shear stress $\boldsymbol{v_{uv}}$ and factored slab moment resisted by the column $\boldsymbol{M_{sc}}$ are determined at the centroidal axis ***c-c*** of the critical section. The maximum factored shear stress may be calculated from:

$$v_{u,AB} = v_{uv} + \frac{\gamma_v M_{sc} c_{AB}}{J_c}$$

or

$$v_{u,CD} = v_{uv} - \frac{\gamma_v M_{sc} cCD}{J_c}$$

where $\boldsymbol{\gamma_v}$ is given by Eq. (8.4.4.2.2).

For an interior column, $\boldsymbol{J_c}$ may be calculated by:

$\boldsymbol{J_c}$ = property of assumed critical section analogous to polar moment of inertia