CODE

lightweight concrete. Linear interpolation shall be permitted if partial sand replacement is used.

9.5.2.4 — For continuous members, I_e shall be permitted to be taken as the average of values obtained from Eq. (9-8) for the critical positive and negative moment sections. For prismatic members, I_e shall be permitted to be taken as the value obtained from Eq. (9-8) at midspan for simple and continuous spans, and at support for cantilevers.

9.5.2.5 — Unless values are obtained by a more comprehensive analysis, additional long-term deflection resulting from creep and shrinkage of flexural members (normalweight or lightweight concrete) shall be determined by multiplying the immediate deflection caused by the sustained load considered, by the factor λ_Δ

$$\lambda_\Delta = \frac{\xi}{1 + 50\rho'} \qquad (9\text{-}11)$$

where ρ' shall be the value at midspan for simple and continuous spans, and at support for cantilevers. It shall be permitted to assume ξ, the time-dependent factor for sustained loads, to be equal to:

5 years or more	2.0
12 months	1.4
6 months	1.2
3 months	1.0

COMMENTARY

R9.5.2.4 — For continuous members, the code procedure suggests a simple averaging of I_e values for the positive and negative moment sections. The use of the midspan section properties for continuous prismatic members is considered satisfactory in approximate calculations primarily because the midspan rigidity (including the effect of cracking) has the dominant effect on deflections, as shown by ACI Committee 435[9.17,9.18] and SP-43.[9.11]

R9.5.2.5 — Shrinkage and creep due to sustained loads cause additional long-term deflections over and above those which occur when loads are first placed on the structure. Such deflections are influenced by temperature, humidity, curing conditions, age at time of loading, quantity of compression reinforcement, and magnitude of the sustained load. The expression given in this section is considered satisfactory for use with the code procedures for the calculation of immediate deflections, and with the limits given in Table 9.5(b). The deflection computed in accordance with this section is the additional long-term deflection due to the dead load and that portion of the live load that will be sustained for a sufficient period to cause significant time-dependent deflections.

Eq. (9-11) was developed in Reference 9.19. In Eq. (9-11) the multiplier on ξ accounts for the effect of compression reinforcement in reducing long-term deflections. $\xi = 2.0$ represents a nominal time-dependent factor for 5 years duration of loading. The curve in Fig. R9.5.2.5 may be used to estimate values of ξ for loading periods less than five years.

If it is desired to consider creep and shrinkage separately, approximate equations provided in References 9.13, 9.14, 9.19, and 9.20 may be used.

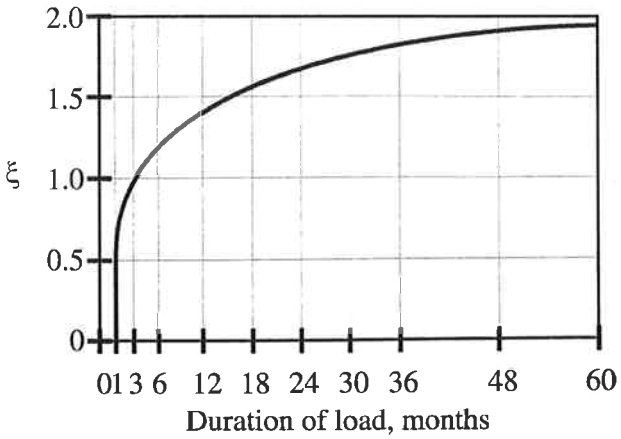

Fig. R9.5.2.5—Multipliers for long-term deflections