CHAPTER III

NUMERICAL EXAMPLES AND RESULTS

Inverted channel floor units subjected to uniformly distributed load of intensity q as shown in Fig.1 are analysed by the proposed method with the use of the computer system. The Poisson's ratio, ν, of the material is taken as 0.20 and the span length, b, is 400 cm. In these examples, the Poisson's ratio and the span length are kept unchanged while the other dimensions vary.

All the stress resultants and displacements are calculated to the number of terms where the last term is less than $\frac{1}{4}$ % of the partial sum of the series, but not more than 100 terms, i.e., the value of n is not more than 200.

The stress resultants and deflections are determined for the unit which the width from the middle plane of the vertical plate to the other, 2a, is 30 cm., the depth from the bottom of the vertical plate to the middle plane of the horizontal plate, 2c, is 15 cm., the thickness of the horizontal plate, t_d, is 4 cm. and the thickness of the vertical plate, t_w, is also 4 cm. The distributions of stress resultants and deflections at the trasverse sections, y/b = 0, 0.1, 0.2, 0.3, 0.4 and 0.5, are plotted against x_d-axis and x_w-axis in Fig.5.

The thickness of the vertical and horizontal plates are then varied from 3 to 5 cm. The comparison of the results, at the critical transverse sections, between different thickness in Fig.6 shows that the thickness has almost no influence on the stress resultants, except the longitudinal bending moment, M_{yd}, and the longitudinal shearing force, V_{yd}, which increase as the thickness increase, but the deflections are reduced considerably while the thickness increase.

Varying the depth of the first example, to become 10 cm. and 20 cm., gives the stress resultants as compared in Fig.7. The values of the longitudinal bending moment, M_{yd}, and the longitudinal normal force, N_{yw}, for the 20-cm. depth are about one=fifth and one-third of the values for the 10-cm. depth respectively. The rest of the stress resultants, other than transverse bending moment, M_{xd}, and transverse shearing force, V_{xd}, which are virtually the same for various depths, are reduced roughly by a half as the depth is doubled. The deflections for the 20-cm. depth are decreased to about one sixth of the deflections for the 10-cm. depth.

Another group of numerical examples has constant depth equals to 30 cm. and constant thickness equals to 4 cm. with the width varies from 40 cm. to 60 cm. and 80 cm. The comparison of stress resultants and deflections obtained from the simple bending theory, in terms of N_{yd}, N_{yw}, N_{xyw}, and w_d, and the results from the proposed method for the 40-cm. width is shown in Fig.8. It can be seen that the solutions obtained from both methods are very close together.

In Fig.9 and 10 which the widths are equal to 60 cm. and 80 cm. respectively, the results from the simple bending theory using the effective width specified by the ACI building code are also given for comparison. While the width is 60 cm. the results are in good agreement but when the width is increased to 80 cm. the discrepancies are greater as it can be seen in Fig.10.

For the 80-cm. width, all the stress resultants, include bending moments and shearing forces in the vertical plate, and the deflections at the transverse sections are plotted in Fig.11. to show their distributions, since the effect of thin plate in bending is less significant when the width is smaller and are not shown in Fig.5.