Analysis of Grid Structures

Abstract
Today computers play an integral part in the analysis and design of civil engineering structures. Hand calculation is limited to simple structures, and initial member sizing (either during the preliminary design or prior to computer analysis). The matrix theory of structural analysis first began appearing in the early 1950s. Since that time, the engineers were not familiar with this new concept, hence a relationship between the matrix structural analysis, and the classical methods arise but the structural engineers as designers still follow the classical methods of solution such as, Hardy Cross moment distribution, Kani's method and deflection distribution method (D. D method), etc. Structures that were too complicated to solve by classical calculations can now be handled with comparative ease when using computers. The analysis of complicated systems, such as highly indeterminate structures like space structures, grids-shells, etc. often could be handled by making many simplifying assumptions, to such extent, that in many cases the validity of the results had to be questioned. The use of computer techniques has broadened the scope of what the engineer can now handle in a reasonable time, and at a reasonable cost. Structures such as canopies, floor systems, and bridge deck systems. Are known as Grid structures. The members of a grid structure in general are subject to torsion as well as to shear and bending. Since the external loads are normal to the plane of the structure, the axial deformations are negligible. Consequently, a free joint in a grid is subject to a linear displacement perpendicular to the plane of the structure and to a rotation in the plane of the structure. It must be realized that the; use of so called matrix algebra methods and principles and methods of analysis, systematic matrix techniques have been now developed into recognized methods.