WATANACHAI SMITTAKORN : A SIMPLIFIED METHOD OF ANALYSIS FOR FLAT PLATE STRUCTURES. THESIS ADVISOR: PROF.EKASIT LIMSUWAN,Ph.D. 73 PP.

A simplified method for analysing flat plate structures in 2 dimensions has been developed from an analytical model of finite element in 3 dimensions, applying a concept of equivalent column as which stiffness depends on column stiffness and attached stiffness. However, the simplified method presented in this thesis introduces column stiffness and slab stiffness in accordance with prismatic member of constant cross-section. Attached stiffness or torsional stiffness is controlled by 2 major parameters as slab thickness and panel width to span ratio. The analytical model for determining relationship of the attached stiffness has been considered only when number of spans vary from 1 to 4. And it has been found that the attached stiffness is proportional to cubic of slab thickness and may be represented in second degree polynomial of panel width to span ratio.

The simplified method can be used for flat plate structures of any spans as panel ratio less than two. If panel width to span ratio less than 1.0, the solution of the simplified method will show well agreement with the finite element method as the variation within 3%. Some discrepancies are found when the width to span ratio is larger, but the maximum one has been shown up to 20% as for the width to span ratio is about 2.0. In case of multi-span structures with different span length, and the adjacent span is less than two, the deviation of bending moment at exterior column will be within 11 % and within 24% of the one at interior columns.

Conceptually, the simplified method is similarly to the equivalent frame method, the difference is only the torsional stiffness as which column size and panel width becomes more influenced in the equivalent frame method while ratio of panel width to span becomes more critical in the simplified method. Comparison studies have found some discrepancies between these two methods if the column size to panel ratio is between 1/9 and 1/11. On the other hand, if the ratio is beyond this limitation, the difference will be larger than 20%. The linear relationship of the attached stiffness with the panel width to span ratio has shown reasonable agreement with the finite element method when the panel width to span ratio is between 0.75-1.50 with discrepancies only 10%.