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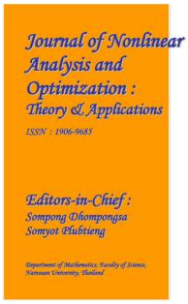

MATHEMATICAL MODELING AND ANALYSIS OF SLABS

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ABSTRACT
This paper presents mathematical demonstrating of slabs, direct displaying and dissecting of two way section in a limited component based programming software RISA 3D and in comparing with SAP for exactness, The distinction in outcome was subsequently mediocre. Taking into account of this, in demonstrating non line a rmodeling and analysis is done by same software. For one way and two way rectangular sections, which incorporate both material and mathematical modeling of the slabs. Flexural load is applied for examination of one way and two way slab. The uprooting form and break example of slab is introduced which shows the proper way of behaving of slabs.
Keywords: Slabs, Nonlinear Modelling, Analysis, RISA3D.

INTRODUCTION

AccordingtoIS456-2007,Two way slab is designated as ratio of longer span to shorter span isless than 2, if greater than two it is considered asOne way slab. The way of behaving ofone wayslab, twisting just in one bearing, while for two wayslab the bending is in bi-directional. The behavior ofthe member is checked under applying Boundary condition, material Modeling and mathematical demonstrating. Numerical analysis is done by using RISA 3D software. In Finite element modeling the slab is discretized into various finite elements applying boundary conditions, Flexural Analysis is done for One way and Two way slabs.

LINEARMODELINGANDANALYSIS

A linear modeling of two way slab is done in bothRISA 3D and SAP Software. Considering slab sizeof 3mX1m without reinforcement. In Concrete andsteel plate for application of load is considered as linear elastic isotropic, Linear analysis is performed. Flexural analysis load of 0.5KN is applied on four plates resultant displacement is 0.56 m and 0.49m. Hence results are tolerable when compared. This is shown in Fig [1]. Compressive strength of concreteis taken as 20N/mm2. The Boundary conditions as used in section.

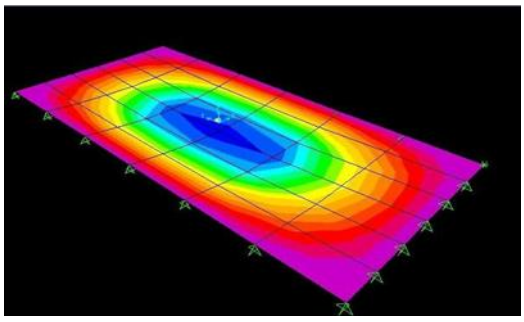
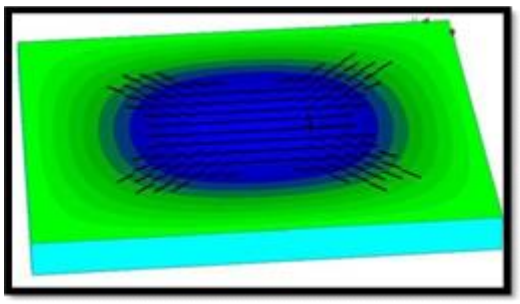


Fig1 Two way Behavior of slab inSAP



NONLINEARMODELINGANALYSIS

One way slab of dimension 1mX2m with a clearcover of 15mm. Two slab of dimension 1.5mx2mwith clear cover of 15mm. Reinforcement of size8mm diameter bars at 150mm c/c along both thespans. Depth of slab is considered to be 120mm.Concrete is taken as 8 Noded 3 Dimensional Isoparametric brick element and reinforced bar as two noded element.

MaterialModelling

Concrete is modelled as CC3DNonLinCementitiousconcrete i.e., linearly elastic and perfectly plastic incompression. Compressive strength of concrete is fcu=20Mpa and the nonlinear behavior of concrete in the bi axial state is described by means of effective stress and the equivalent uniaxial strain. Tensile strength of concrete ft, from EUROCODE-2is yt=0.3(ycu)2/3

Considering shrinkage effect dividing the tensile strength by a factor 1.7. Therefore ft=1.3Mpa;

Modulus of elasticity of concrete Ec.

FromEUROCODE-2 is

I.Ec=9.5(8+ycu)3

Considering practical conditions dividing by thefactor1.24,

Therefore Ec=2.32X104Mpa

Poison's ratio of concrete μ=0.2

Fracture energy Gf of concrete from The CEB-FIP model code Finite Element Modeling Mesh Size is taken as 75mm. Forslab type it istaken as brick size and for loading tetrahedron mesh is considered. 0.5KN is applied on each plate forboth one way and two way slabs. The variation of mesh type is shown in Fig[3].

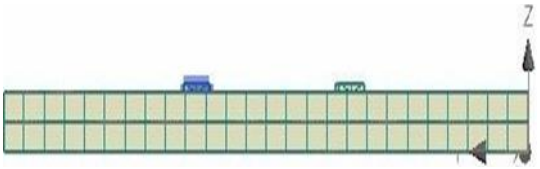
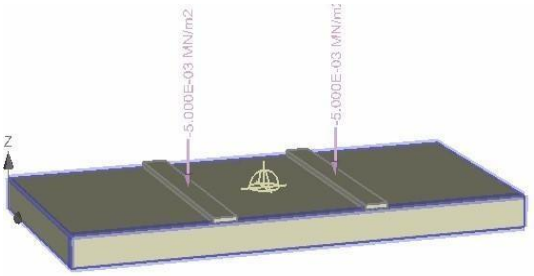


Fig3 Variation of Finite Element Mesh type.

Boundary Conditions

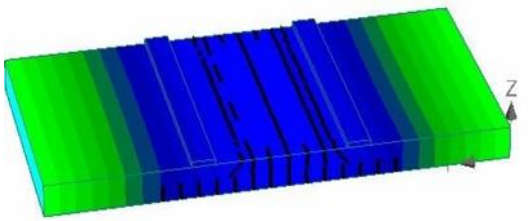
In case of one way slab simply supported conditionis applied and checked for one way slab behavior.Slabissupportedalongshortspanandarerestrained as shown in Fig[4]. A flexural load as twopoint line load at equidistant are shown in Fig[4.a].The one way slab behavior is obtained Fig[4.b] by displacement contour and initial crack pattern.



Fig[4.a]Flexural application for Oneway slab

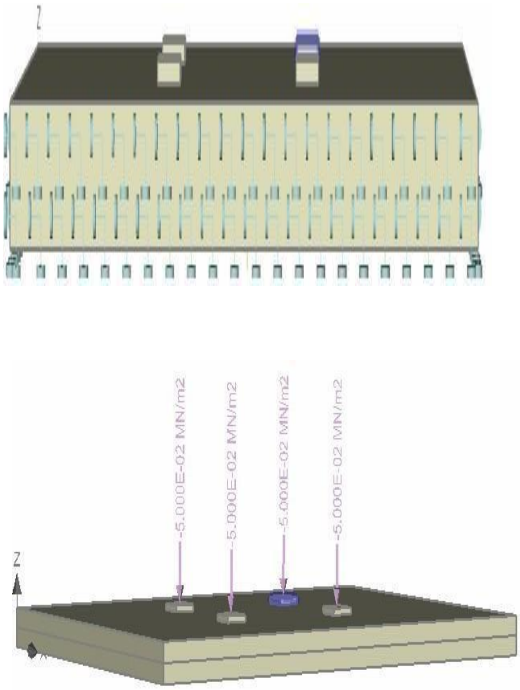
Gf=Gf0($\underline{fcm}$xfcm0)

Therefore Gf=5.36X10-5MN/m and Poisson's ratio of steel μ=0.3.
The steel plates utilized at it are expected as straightly flexible and isotropic to stack focuses. The support bars are demonstrated as bilinear discrete components. Yield strength of the steel is taken to be 415Mpa. Analysis and Iterations are finished by altered Newton Raphson's strategy. Association among concrete and built up bar is viewed as awesome. The formulae are as per Eurocode 2: (Design of Concrete structures EN1992-1-1)

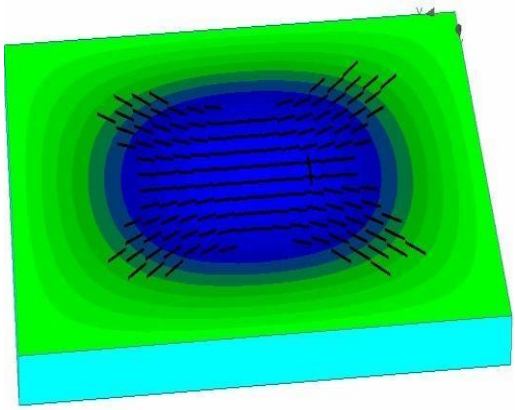


Fig[4.b]Displacement Conotur and crack pattern of One way slab

To accomplish the two way section sides of plate are controlled along more Limited range as similar to that displayed in Fig[4].The two way slab conduct is accomplished by displayed in **Fig[5.a] by uprooting the shape of an introductory design.**



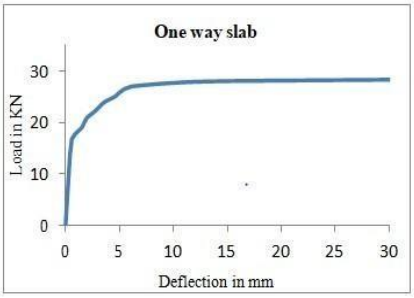
Fig[5.b] Flexural application for Oneway slab



Fig[5.c]Displacement Conotur and crack pattern of Two way slab

The corresponding Load Vs Deflection profile ofone way slab and two way slab are shown in

Fig[6.a 6.b] which shows the ultimate load of 27KNand167KNrespectively.
It is observed that two way slab is carrying greater load than that of One way slab.



Fig[6.a] Load Vs Deflection profile of one way slab

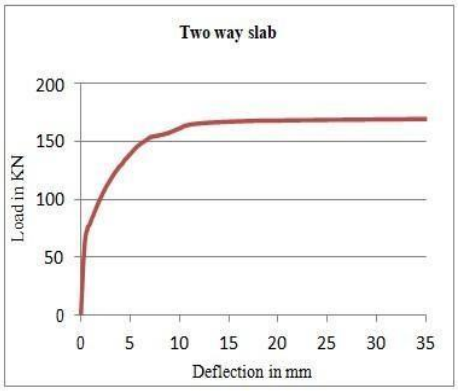


Fig [6.b] Load Vs Deflection profile of Two wayslab

CONCLUSIONS

1. In Examination of consequences of SAP andRISA3Danddistinctioninoutcomesis14%.
2. Non Linear analysis of just upheld one way andtwo way slab is done and their way of behavingisaccomplished.
3. Flexural analysis is done and relating load VsDeflectionprofileisplotted.
4. It is observed that two way slab is taking an ultimate laod of 27KN and 167KN than onewayslabsection.

FUTURERESEARCH

Mathematical displaying and flexural investigation of segmental composite one way and two way pieces by utilizing support type, cross section type and double steel type shear connectors.

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