

BIRLA INSTITUTE OF TECHNOLOGY AND SCIENCE, PILANI
 Second Semester (2016-2017), Comprehensive Examination
 Course: Theory of Plates and Shells, CE G553 [OPEN BOOK]

Date: 7th May 2017(Room:2201)

Max. Marks: 70

Duration:8:00AM-11:00AM

- Q.1. The mid-surface of a doubly curved shell panel, simply supported on all four sides is shown in **Fig.1**. This shell panel is subjected to uniformly distributed load(q_0) as shown in the figure. Write the five governing differential equations in terms of displacements considering the effect of transverse shear strains. Solve these five equations for the given data by Navier's method and discuss the results. [20]

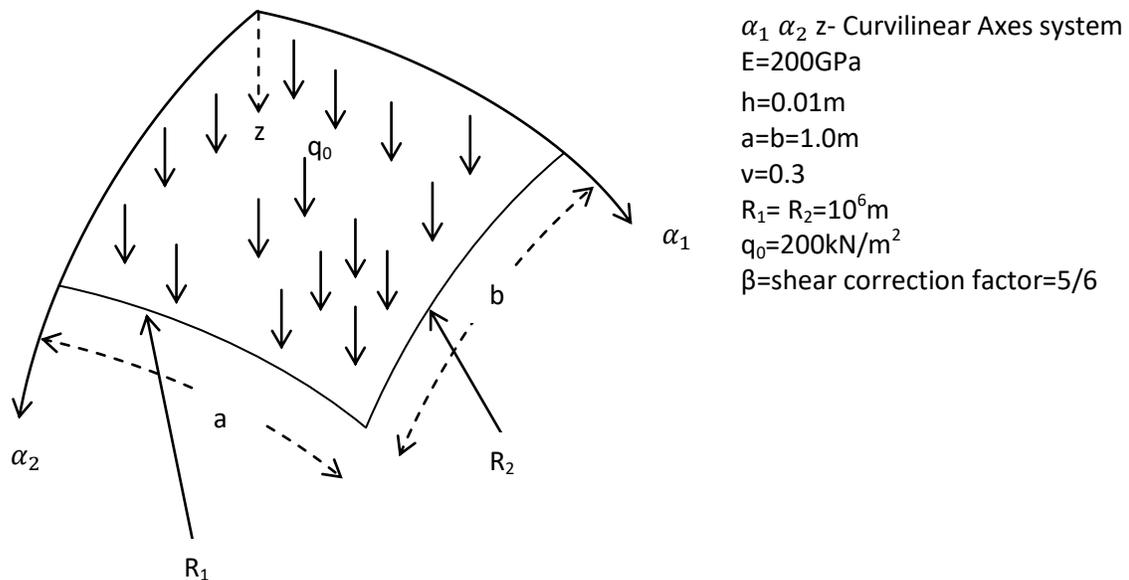


Fig.1 Simply supported doubly curved shell panel

- Q.2. Find the deflection and rotations of the simply supported plate(**Fig.2**) at two different points, A(0.5m, 0.45m) and B (0.5m, -0.45m). The plate is subjected to a concentrated moment of 50kNm at the centre of one of the edge as shown in the figure. Use Levy's method to solve. Take, $E=10.92 \times 10^6 \text{ kN/m}^2$, $h=0.01\text{m}$ and $\nu=0.3$. [20]
- Q.3. A square plate($1\text{m} \times 1\text{m} \times 0.01\text{m}$) fixed on two opposite sides and simply supported on two opposite sides is subjected to a uniformly distributed transverse load of 1kN/m^2 . Calculate the central deflection of the plate by finite difference method. Take, $E=10.92 \times 10^6 \text{ kN/m}^2$ and $\nu=0.3$. Take 4×4 division of the plate. Find the bending moments and torsional moments at the centre of the plate. Also find the shear forces along the edges. [20]

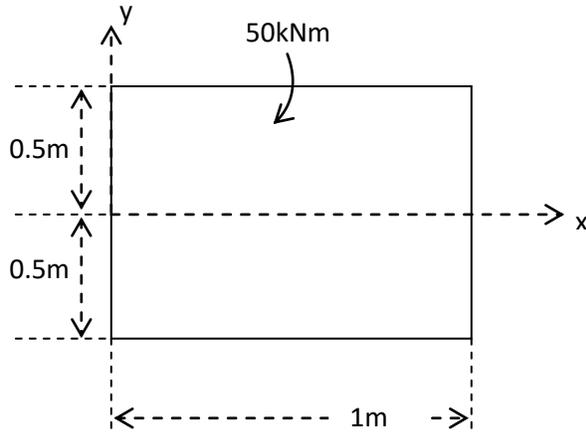


Fig.2. Simply supported plate

- Q.4. A simply supported square plate is subjected to a concentrated load P . Find the central deflection of the plate by Navier's method neglecting the effect of transverse shear strain. Take $E=2 \times 10^{11}$ N/m^2 , $\nu=0.3$, thickness of plate (h)= 0.01m and $a=b=1.0\text{m}$ and $P=0.55\text{kN}$. Position of load P is $(0.75, 0.5)$. Find the rotations and shear forces at the edges. [10]

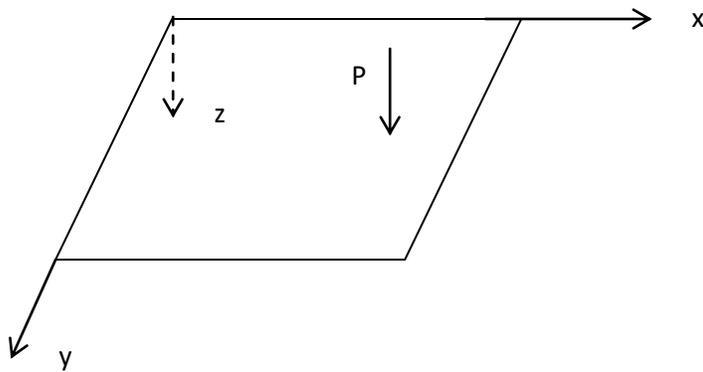


Fig.3. Simply supported plate subjected to a transverse concentrated load