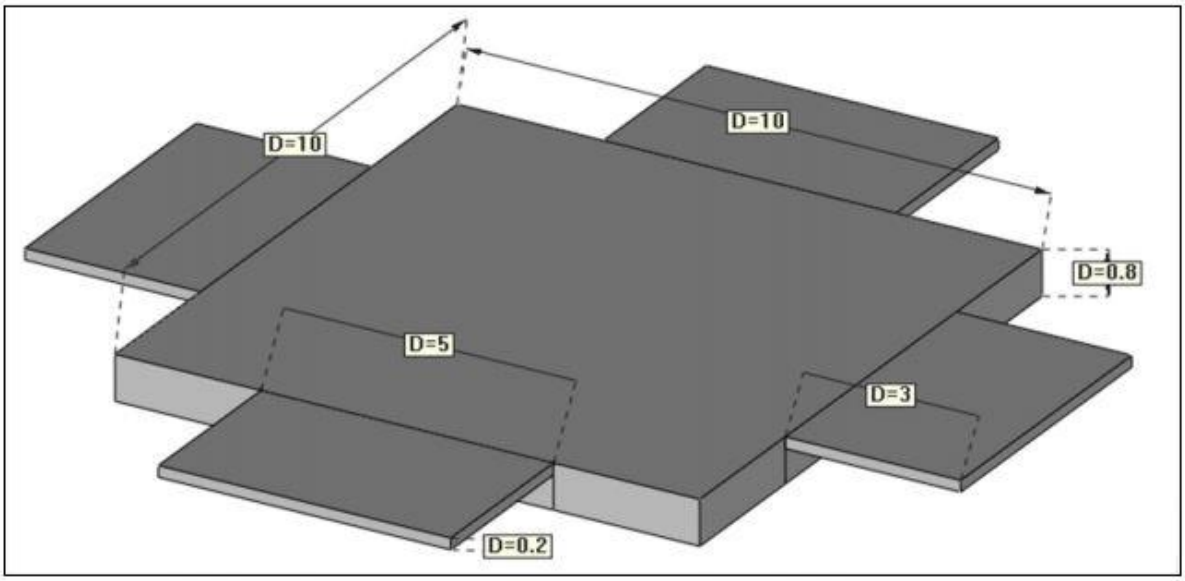
CSMD ASSIGNMENT-7

Plates

-By Anurag Bhattacharjee

Ques 1. (A) Think first and answer later. What kind of strategy (theory, elements, integration rule, boundary conditions, etc.) will you use for solving the following problems?



Solution-

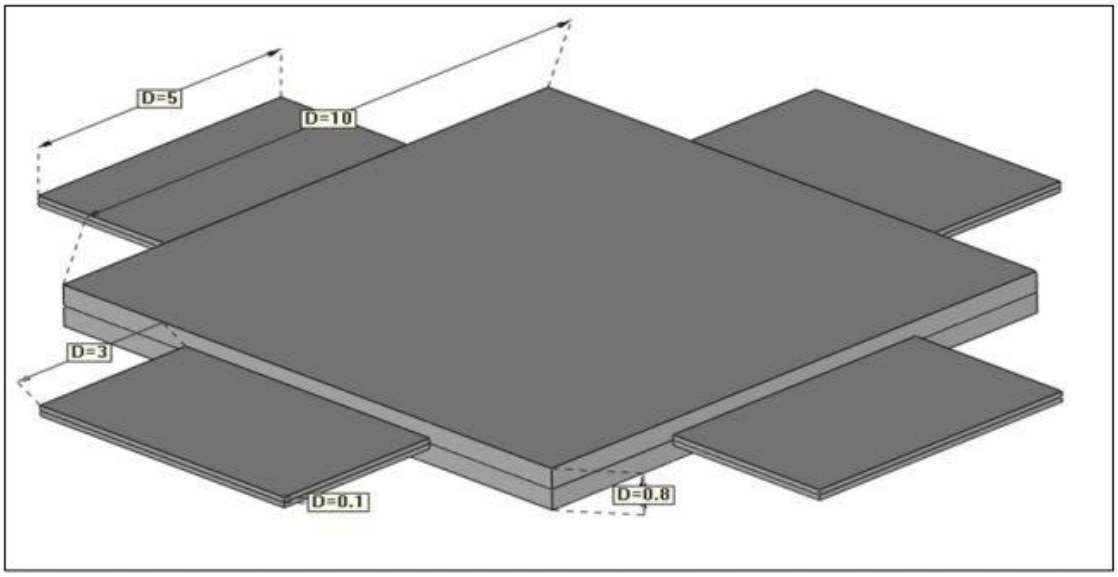
Theory: Reissner-Mindlin Plate theory .

Element: Rectangular element

Integration: Reduced integration

Boundary Conditions:
1)Zero relative movement between the smaller and bigger plates at the plane of joint.
2) No rotation or translation of the plates about an axis normal to the plates.

Ques 1. (B) Think first and answer later. What kind of strategy (theory, elements, integration rule, boundary conditions, etc.) will you use for solving the following problems?



Solution-

Theory: Kirchhoff Plate theory .

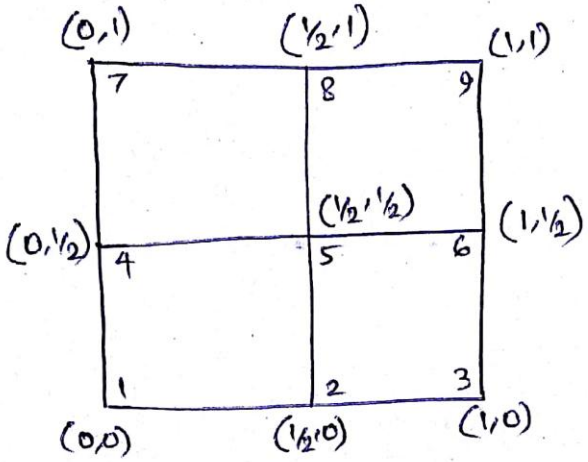
Element: Rectangular element

Integration: Full exact integration

Boundary Conditions:
1)Zero relative movement between the smaller and bigger plates at the plane of joint.
2) No rotation or translation of the plates about an axis normal to the plates.

Part-B

A nine-noded element with 4 quadrants is taken for this test.



The nodal forces are considered zero.

Vertical displacement

$w = \frac{1}{2}x^2 + \frac{1}{2}y^2 + \frac{1}{2}xy$

Rotations (Taken as derivates of w)

$\theta_x = x + y/2$

$\theta_y = y + x/2$

Solving these values analytically, and comparing with the MCZ element code, we have (for node 5 (½,½))-

	w	θ_x	θ_{xy}	ε_x	ε_y	σ_{xy}
Analytical solution	0.25	0.75	0.75	−1	−1	−1
Element MCZ code	0.37	0.74	0.75	−1	−1	−1

Since the values are similar, we can say that the patch test is verified.