

## Unit 13 - Week 10: Two dimensional Vector field and Eigen value problems

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MATLAB
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Live session: Dr. Atanu Banerjee, Date : 16/12/2020 Time : 3:15:00 PM

### Assignment 10

The due date for submitting this assignment has passed. As per our records you have not submitted this assignment.

**Due on 2020-11-25, 23:59 IST.**

A thin triangular domain ABC, shown in Fig. 1, is supporting traction acting normal to the edge AC and is on roller support along AB and BC. Assume it a plane stress problem, Young's modulus  $E = 200$  GPa and Poisson's ratio  $0.3$ . Model the domain with one 3-noded triangular element and answer the following questions. The local node numbers are shown in **RED** and the nodal degree of freedom are illustrated in **BLUE**. All the subscripts in the questions refer the same numbers shown in the Figure.

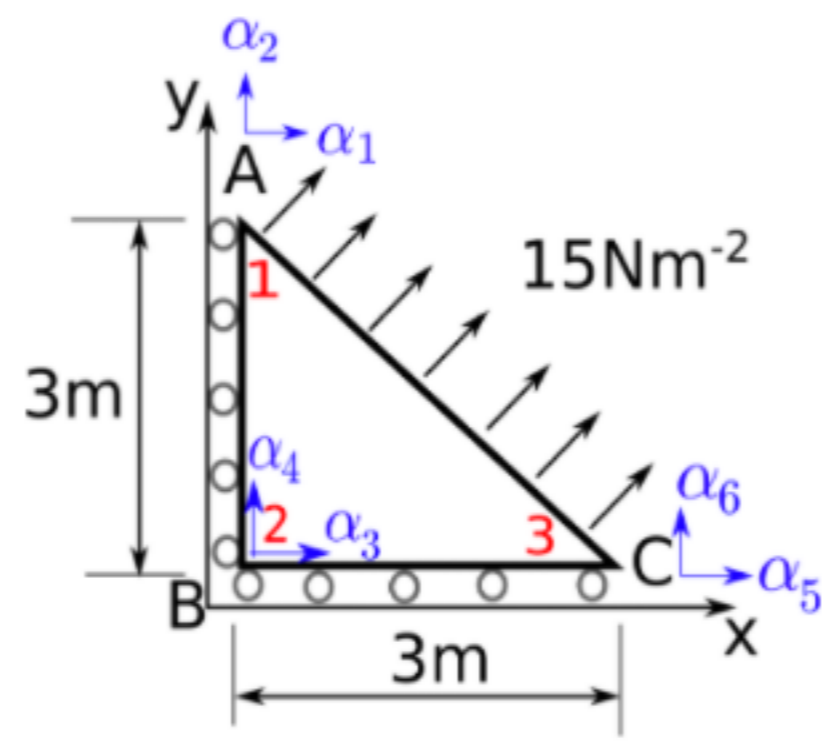


Figure 1

1) Which of the following represents the correct expressions for the shape functions (refer Fig.1) 2 points

- (a)  $N_1 = x/3, N_2 = y/3, N_3 = x + y - 3$
- (b)  $N_1 = y/3, N_2 = x/3, N_3 = x + y - 3$
- (c)  $N_1 = x/3, N_2 = y/3, N_3 = (x - y - 3)/3$
- (d)  $N_1 = y/3, N_2 = (3 - x - y)/3, N_3 = x/3$

No, the answer is incorrect. Score: 0

Accepted Answers: (d)  $N_1 = y/3, N_2 = (3 - x - y)/3, N_3 = x/3$

2) What is the value of  $B_{22}$  (B refers the strain displacement matrix) 2 points

- (a) 1/3
- (b) -1/3
- (c) 2/3
- (d) -2/3

No, the answer is incorrect. Score: 0

Accepted Answers: (a) 1/3

3) What is the value of  $D_{22}$  (D refers the stress strain matrix for plane stress case) 2 points

- (a)  $2.19780 \times 10^{11} \text{ N/m}^2$
- (b)  $1.19780 \times 10^{11} \text{ N/m}^2$
- (c)  $0.65934 \times 10^{11} \text{ N/m}^2$
- (d)  $0.76923 \times 10^{11} \text{ N/m}^2$

No, the answer is incorrect. Score: 0

Accepted Answers: (a)  $2.19780 \times 10^{11} \text{ N/m}^2$

4) Which of the following represent the Dirichlet boundary condition for this problem. 2 points

- (a)  $\alpha_1 = \alpha_2 = \alpha_3 = \alpha_4 = 0$
- (b)  $\alpha_1 = \alpha_3 = \alpha_4 = \alpha_6 = 0$
- (c)  $\alpha_1 = \alpha_2 = \alpha_4 = \alpha_6 = 0$
- (d)  $\alpha_2 = \alpha_3 = \alpha_4 = \alpha_6 = 0$

No, the answer is incorrect. Score: 0

Accepted Answers: (b)  $\alpha_1 = \alpha_3 = \alpha_4 = \alpha_6 = 0$

5) Calculate the value of  $K_{22} = \dots \times 10^{11} \text{ N/m}$

Hint

No, the answer is incorrect. Score: 0

Accepted Answers: (Type: Range) 1.08, 1.1

2 points

6) Calculate the value of  $K_{25} = \dots \times 10^{10} \text{ N/m}$

Hint

No, the answer is incorrect. Score: 0

Accepted Answers: (Type: Range) 3.28, 3.3

2 points

7) Calculate the value of  $K_{55} = \dots \times 10^{11} \text{ N/m}$

Hint

No, the answer is incorrect. Score: 0

Accepted Answers: (Type: Range) 1.08, 1.1

2 points

8) Calculate the value of  $F_2 = \dots \text{ N}$

Hint

No, the answer is incorrect. Score: 0

Accepted Answers: (Type: Range) 22.4, 22.6

2 points

9) Calculate the value of  $F_5 = \dots \text{ N}$

Hint

No, the answer is incorrect. Score: 0

Accepted Answers: (Type: Range) 22.4, 22.6

2 points

10) The displacement at A in y direction, i.e.,  $\alpha_2 = \dots \times 10^{-9} \text{ m}$

Hint

No, the answer is incorrect. Score: 0

Accepted Answers: (Type: Range) 0.14, 0.16

2 points