Unit 13 - Week 11: Discretization

Assignment 11

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

Due on 2020-12-02, 23:59 IST.

1) Choose True/False for the following assertion: "It is much easier to establish the discretized quantities in spatial configuration." *1 point*

- (a) True
- (b) False

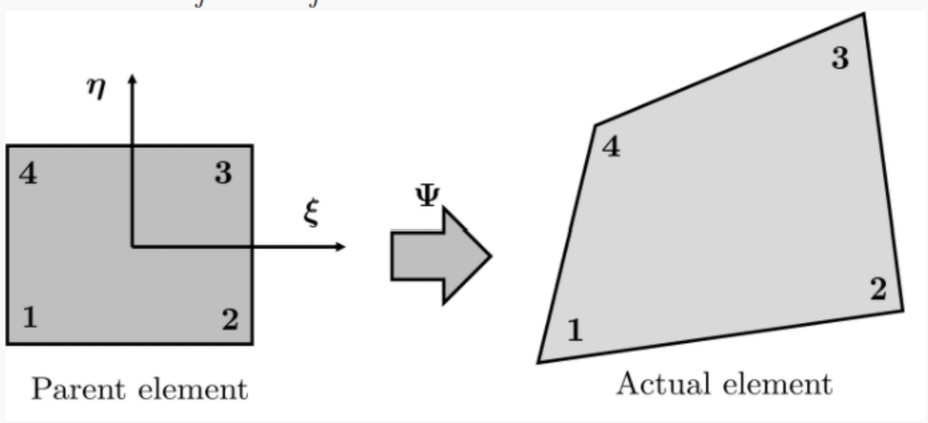
No, the answer is incorrect.
Score: 0
Accepted Answers:
(a) True

2) For infinitesimal deformation the final tangent matrix can also be approximated as *1 point*

- (a) the initial stress matrix.
- (b) the constitutive component of the tangent matrix.
- (c) either of the initial stress matrix or the constitutive component of the tangent matrix.
- (d) the identity matrix.

No, the answer is incorrect.
Score: 0
Accepted Answers:
(b) the constitutive component of the tangent matrix.

For Questions 3 - 8 use the following:
Refer to the below Figure. It shows an element e in the physical (spatial) domain and parent (material) domain. The size of the element in the parent (material) domain is 2×2. The origin at time $t = 0$ is at the center of the parent element. The spatial coordinates $\boldsymbol{x}$ of the element are $\boldsymbol{x}_1 = (4, 2)^{\mathrm{T}}$, $\boldsymbol{x}_2 = (8, 4)^{\mathrm{T}}$, $\boldsymbol{x}_3 = (6, 8)^{\mathrm{T}}$ and $\boldsymbol{x}_4 = (4, 6)^{\mathrm{T}}$. Consider a Neo-Hookean material under plane strain condition with $\mu = 3$ and $\lambda = 2$. The Cauchy stress tensor for this material is given by $\boldsymbol{\sigma} = \frac{\mu}{J}(\boldsymbol{b} - \boldsymbol{I}) + \frac{\lambda}{J}(\ln J)\boldsymbol{I}$. For $\boldsymbol{X} = (0, 0)^{\mathrm{T}}$ and $\boldsymbol{\xi} = (\xi, \eta)^{\mathrm{T}}$ evaluate the following quantities.



3) The ratio of the volume of the actual element to the parent element is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 3.45,3.55

1 point

4) The value of the bigger of the in-plane principal stretches (i.e. square root of the eigenvalue of right Cauchy-Green deformation tensor) is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 2.20,2.30

1 point

5) The value of the smaller of the in-plane principal stretches (i.e. square root of the eigenvalue of right Cauchy-Green deformation tensor) is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 1.50,1.60

1 point

6) The value of the out-of-plane component of stress σ_{33} is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 0.66,0.74

1 point

7) The value of the first invariant of the Cauchy stress tensor is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 6.80,6.90

1 point

8) The value of the third invariant of the Cauchy stress tensor is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) 5.75,5.85

1 point