

Unit 10 - Week 8: Hyperelasticity - 1

Course outline

How does an NPTEL online course work?

Week 0 : Prerequisite

Week 1: Introduction

Week 2: Mathematical Preliminaries - 1

Week 3: Mathematical Preliminaries - 2

Week 4: Kinematics - 1

Week 5: Kinematics - 2

Week 6: Kinetics - 1

Week 7: Kinetics - 2

Week 8: Hyperelasticity - 1

Lec 26: Constitutive Relations and Constraints, Hyperelasticity, Material Elasticity Tensor

Lec 27: Spatial Elasticity Tensor, Solved Example

Quiz : Assignment 8

Feedback form

Lecture Notes

Solution to Assignment 8

Week 9: Hyperelasticity - 2

Week 10: Linearization

Week 11: Discretization

Week 12: Solution Procedure

Live session

Assignment 8

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

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

1) Principle of _____ states that the past events determine the future.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) *determinism*

1 point

2) Principle of _____ states that the material response at a point depends only on the conditions within an arbitrarily small region about that point.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) *local action*
(Type: String) *local-action*

1 point

3) A material without memory is called a _____ material.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) *elastic*
(Type: String) *elastic simple*
(Type: String) *simple elastic*

1 point

4) A material whose constitutive relation depends on the deformation only through the history of local value of the deformation gradient tensor is called an _____ material.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: String) *simple*

1 point

For Questions 5 - 13 use the following: For a St. Venant-Kirchhoff material the strain energy potential is given by

$\Psi(J, \mathbf{E}) = \frac{\kappa}{2} (\ln J)^2 + \mu \text{tr}(\mathbf{E}^2)$. Here, κ and μ are material constants. The expression for the second Piola-Kirchhoff stress tensor is given by

$$\mathbf{S} = a_1 \mathbf{C}^{a_2} + a_3 (\mathbf{C} - \mathbf{I})$$

where a_1 , a_2 , and a_3 are constants. The expression for the Kirchhoff stress tensor is given by

$$\boldsymbol{\tau} = a_4 \mathbf{I} + a_5 \mathbf{b}(\mathbf{b} - \mathbf{I})$$

where a_4 , and a_5 are constants. The expression for the material elasticity tensor is given by

$$\mathbf{C} = a_6 \mathbf{C}^{a_7} \otimes \mathbf{C}^{a_7} - a_8 \mathbf{I} + a_9 \frac{\partial \mathbf{C}}{\partial \mathbf{C}}$$

where the material fourth order tensor $\mathcal{I} = \frac{\partial \mathbf{C}^{-1}}{\partial \mathbf{C}}$. Assume $\kappa = 1$, $\mu = 2$, and $J = 2$.

5) The value of a_1 is _____. (up to two decimal places only).

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) *.65, .72*

1 point

6) The value of a_2 is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) *-1*

1 point

7) The value of a_3 is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) *2*

1 point

8) The value of a_4 is _____. (up to two decimal places only).

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) *.65, .75*

1 point

9) The value of a_5 is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) *2*

1 point

10) The value of a_6 is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) *1*

1 point

11) The value of a_7 is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) *-1*

1 point

12) The value of a_8 is _____. (up to two decimal places only).

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Range) *1.35, 1.45*

0 points

13) The value of a_9 is _____.

Hint

No, the answer is incorrect.
Score: 0
Accepted Answers:
(Type: Numeric) *4*

1 point