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Unit 6 - Week 4: Analysis and synthesis using pseudo rigid-body models

Assignment Week 4

The due date for submitting this assignment has passed. Due on 2018-02-21, 23:59 IST.
As per our records you have not submitted this assignment.

1) Which of the following is not possible using pseudo rigid-body model approach? ***1 point***

- Function generation
- Path generation.
- Feasibility map generation.
- Motion generation.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Feasibility map generation.

2) Assertion: Torsion spring(s) and a rigid body can replace a compliant segment. Reasoning: The locus of the moving tip of a cantilever beam can be approximated to a circular arc. ***1 point***

- Assertion is correct but not the reasoning.
- Assertion is incorrect but the reasoning is correct.
- Assertion and reasoning are both correct.
- Neither the assertion nor the reasoning is correct.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Assertion and reasoning are both correct.

3) Which of the following are not used for solving compliant mechanism synthesis problem using the PRBM approach? ***1 point***

- Replacement of compliant segments with torsion spring(s) and a rigid bodies.
- Optimization
- Minimum potential energy principle.
- Burmester theory.

No, the answer is incorrect.
Score: 0

Accepted Answers:
Optimization

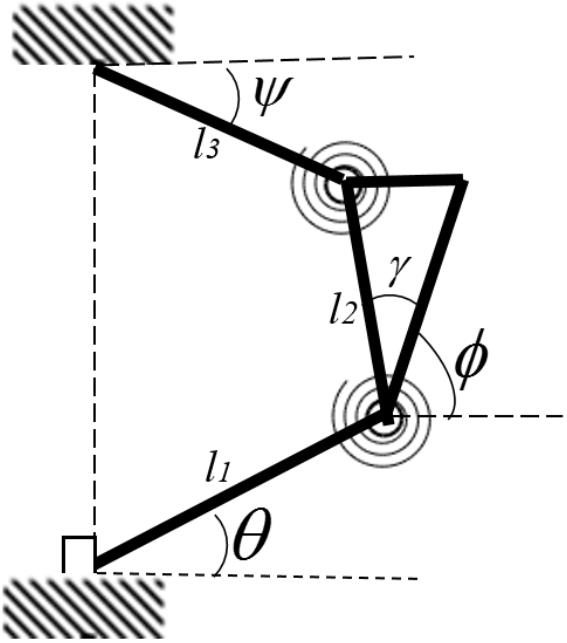
4) Find the torsional spring constant in the PRBM of beam with small length flexure shown in the figure (E = 2.1 GPa, *length of flexure* = 5 mm, *in-plane thickness of flexure* = 0.5 mm, *width* = 1 cm). ***1 point***

- 0.0438 Nm/rad
- 0.0512 Nm/rad
- 0.8028 Nm/rad
- 0.0842 Nm/rad

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.0438 Nm/rad

5) Which of the following is the correct loop-closure equation for the PRBM model of a compliant mechanism? ***1 po***

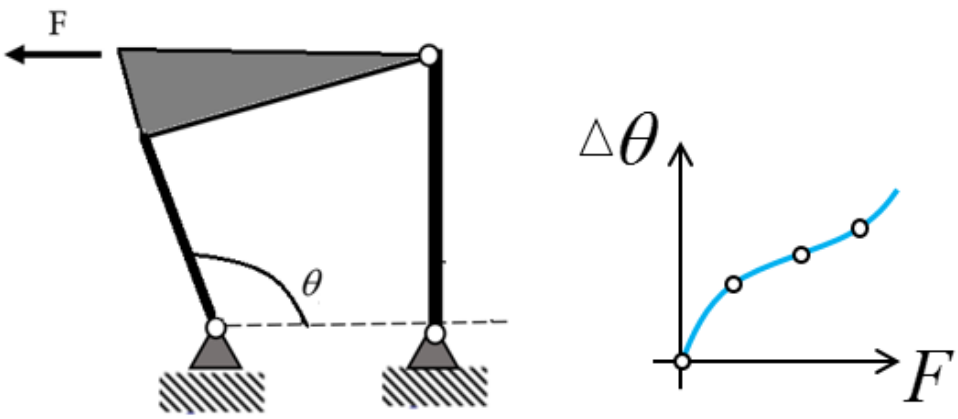


- $l_1 \cos(\theta) - l_2 \cos(\phi) - l_3 \cos(\psi) = 0$
- $l_1 \cos(\theta) + l_2 \cos(\phi + \gamma) - l_3 \cos(\psi) = 0$
- $l_1 \sin(\theta) + l_2 \sin(\phi) + l_3 \sin(\psi) = 0$
- $l_1 \sin(\theta) - l_2 \sin(\phi + \gamma) + l_3 \sin(\psi) = 0$

No, the answer is incorrect.
Score: 0

Accepted Answers:
$l_1 \cos(\theta) + l_2 \cos(\phi + \gamma) - l_3 \cos(\psi) = 0$

6) In a function generation proble of the compliant mechanism shown in the figure, how many free variables need to be chosen in order to solve the synthesis equations? ***1 point***



- 5
- 4
- 3
- 1

No, the answer is incorrect.
Score: 0

Accepted Answers:
5

7) In Q. 6, if the dimensions of the coupler-body are given, how many extra positions are need to be specified so that there are no free variables? ***1 point***

- 4
- 3
- 2
- 1

No, the answer is incorrect.
Score: 0

Accepted Answers:
2

8) A load of constant magnitude is applied to a cantilevered beam tip and it continues to remain in the transverse direction as the beam deforms. Calculate the angle of deflection of cantilever beam when the value of n (ratio of axial to vertical component of force) becomes 0.577. ***1 point***

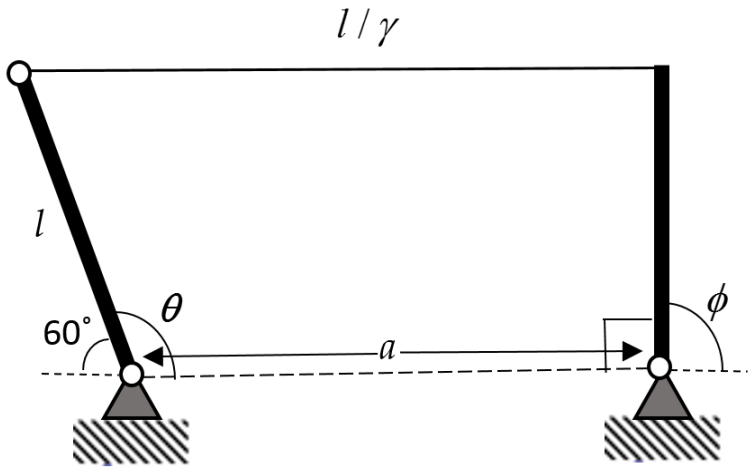
- 45 deg
- 60 deg
- 30 deg
- None of these

No, the answer is incorrect.
Score: 0

Accepted Answers:
30 deg

9) For the compliant mechanism (undeformed state) shown in the figure, calculate the kinematic sensitivity $\frac{d\phi}{d\theta}$ when an external torque = 0.006 Nm has caused θ to deflect by an angle . [Given *l* = a ***1 point***

= 5 cm, γ (characteristic radius factor) = 0.85, $\Delta\theta$ and τ are in clockwise direction]



- 0
- 0.67
- 1
- -0.5

No, the answer is incorrect.
Score: 0

Accepted Answers:
1

10) Calculate the value of $\Delta\theta$ given in Q. 9. Take *EI* = 2.5e-4 and $\gamma\kappa_\Theta$ = 2.25. ***1 point***

- 0.000 rad
- 0.131 rad
- 0.262 rad
- 0.523 rad

No, the answer is incorrect.
Score: 0

Accepted Answers:
0.523 rad

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