



Virtual Evolution Of 2D Soft Robots

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- Project description

Overview

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- Research

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- Further objectives

Project Description

- Generate 2D moving soft bodies

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- Generate 2D moving soft bodies
- Built recursively from unit cells with simple rules
- Resulting in complex emergent properties
- Using genetic algorithms

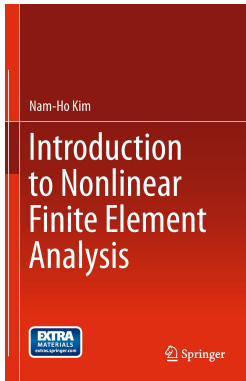
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 - J Hiller & H Lipson - Evolving amorphous robots
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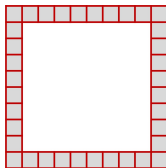
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- N Kim - Introduction to nonlinear finite element analysis



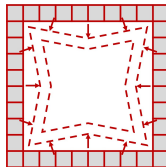
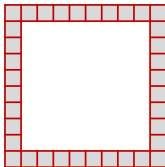
Current Objectives

- 10x10 empty grid of 2D elements



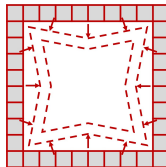
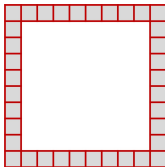
Current Objectives

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- Applying external pressure



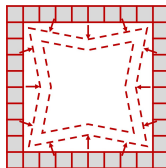
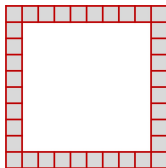
Current Objectives

- 10x10 empty grid of 2D elements
- Applying external pressure
- Linear vs hyperelastic material



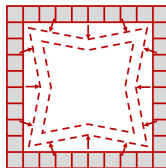
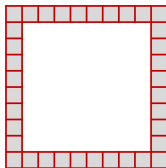
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- Linear vs hyperelastic material
 - Material status completely describable with given total strain



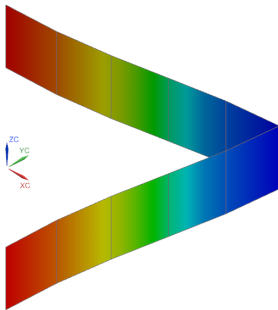
Current Objectives

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- Applying external pressure
- Linear vs hyperelastic material
 - Material status completely describable with given total strain
 - Mold-star 15



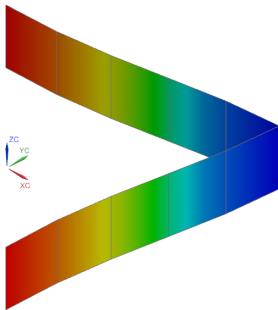
Current Objectives (cont.)

- Compare commercial software (NX 12, LSDyna, Marc Mentat)



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- Implementation with code from N Kim and open source software

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 - Produce square
 - Place between two transparent plates
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- Compare modeled behaviour to actual behaviour
 - Produce square
 - Place between two transparent plates
 - Apply pressure
 - Observe and compare
- Determine which approach
 - Commercial vs. open-source vs. own code
 - All have pros and cons

Further Objectives

- Define unit cell behaviour



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- Define recursive rules

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- Set up genetic algorithm

Further Objectives

- Define unit cell behaviour



- Define recursive rules
- Set up genetic algorithm
- Combine all components

Questions?