Generation And Simulation Of Manufacturable 2D Soft Bodies

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Presentation Overview

- Project scope

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- Objectives

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- Methodology

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- Methodology
- Results

Project Scope

- Automate the generation and simulation of 2D soft bodies

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  - Generate 2D bodies built from smaller building blocks with specific deformations

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  - Generate 2D bodies built from smaller building blocks with specific deformations
  - Non-linear FEM with hyper-elastic material models
  - Evaluate the bodies and building blocks according to predefined goals

Objectives

- Automation for future use and development

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- Selection of best models according to selected metrics
- Accurate modelling of real-world materials
- Computationally efficient manner
- Limitations
  - Two dimensions for simplicity
  - Pre-existing material models

Software

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- Siemens NX 12
- MSC Marc Mentat

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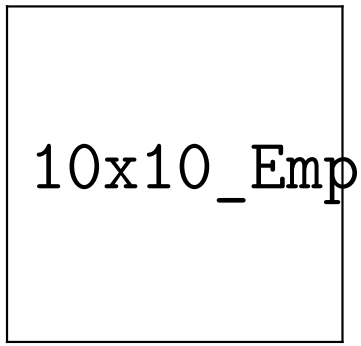
  - Python

Current Objectives

- 10x10 empty grid of 2D elements



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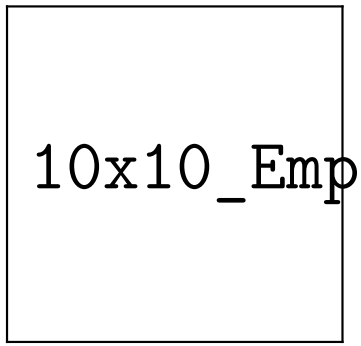
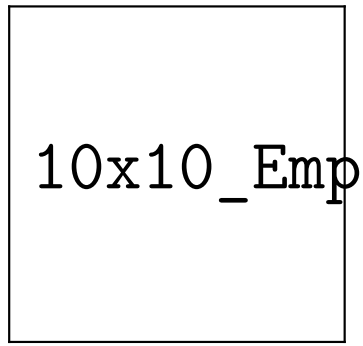
- 10x10 empty grid of 2D elements
- Applying external pressure





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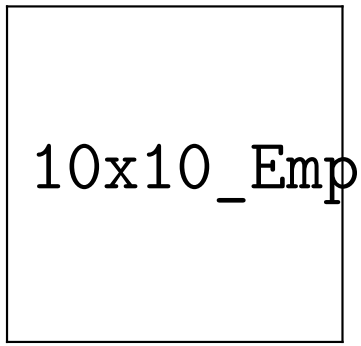
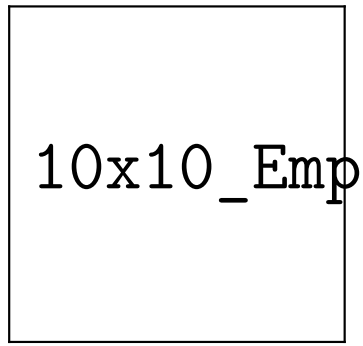
- Linear vs hyperelastic material





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  - Material status completely describable with given total strain

10x10_Empty_Grid.jpg

10x10_Empty_Grid_Und

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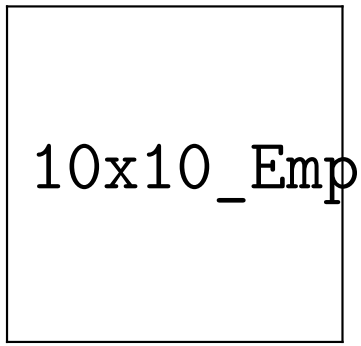

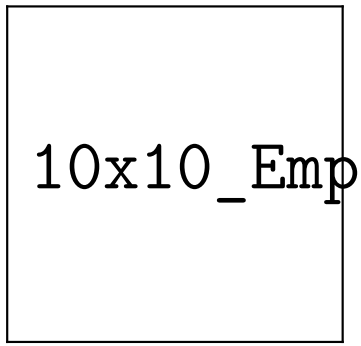

Current Objectives (cont.)

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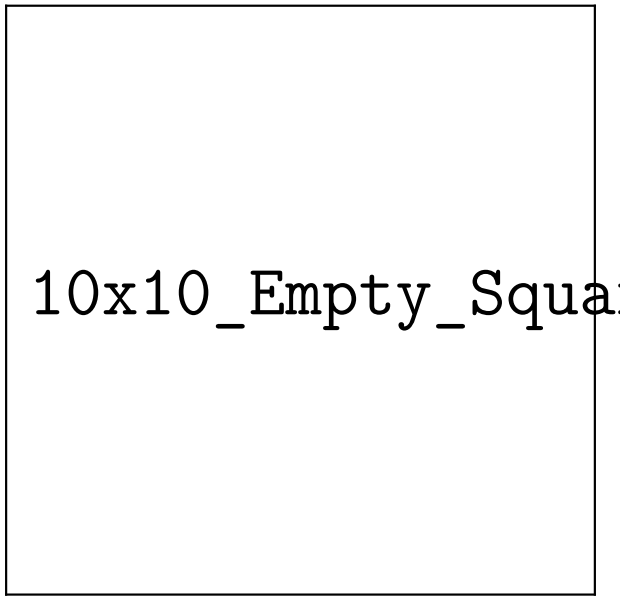

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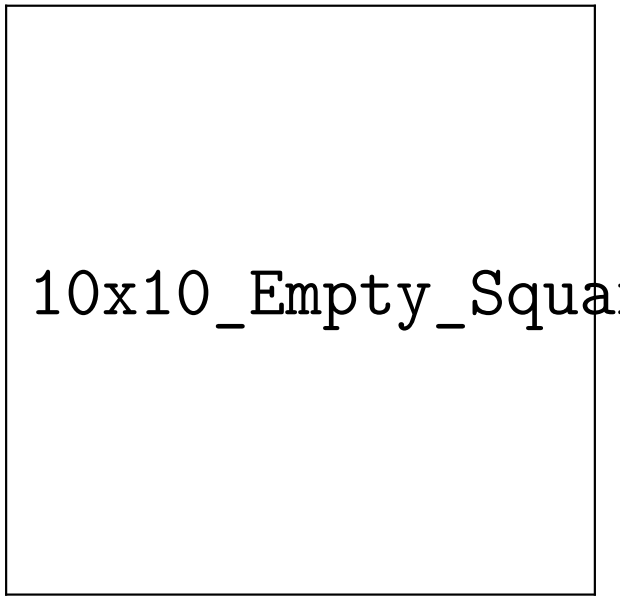

- Implementation with code from N Kim and open source software

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  - 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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- Combine all components

Questions?