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Real-time conversion of tissue-scale mechanical forces into an interdigitated growth pattern

Samuel A. Belteton[1], Wenlong Li[2], Makoto Yanagisawa[3], Faezeh A. Hatam[2], Madeline I. Quinn[1], Margaret K. Szymanski[4], Mathew W. Marley[1], Joseph A. Turner[2] and Daniel B. Szymanski[1,5]

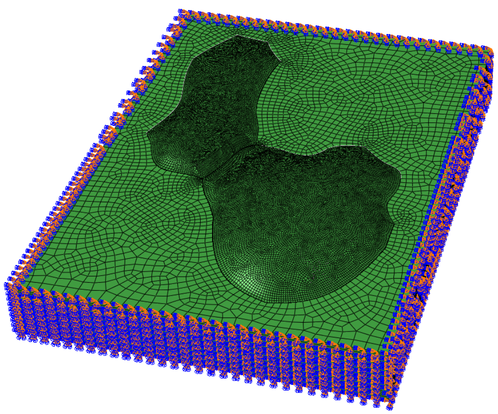
Additional Abaqus information

Dr. Wenlong Li created the Abaqus files shown here

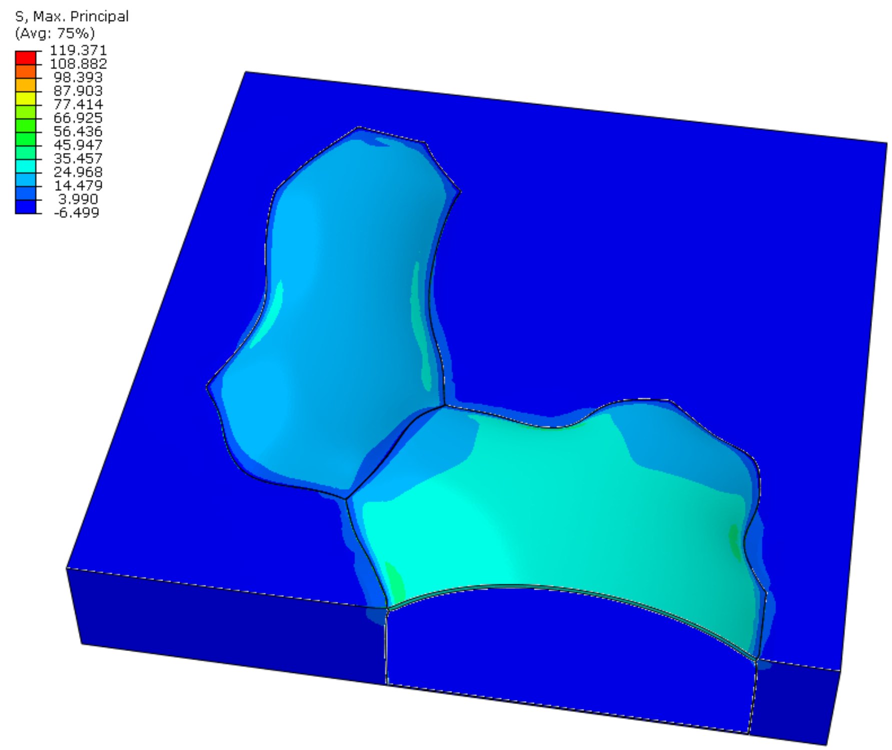
- Abaqus 2019 version was used for the FE analysis.
- The INP input files were created for each cell model in the manuscript which are titled by the figure number.
- For questions, please contact J. Turner (jaturner@unl.edu)

Fig. 2 (INP file)

Assembly and boundary condition.



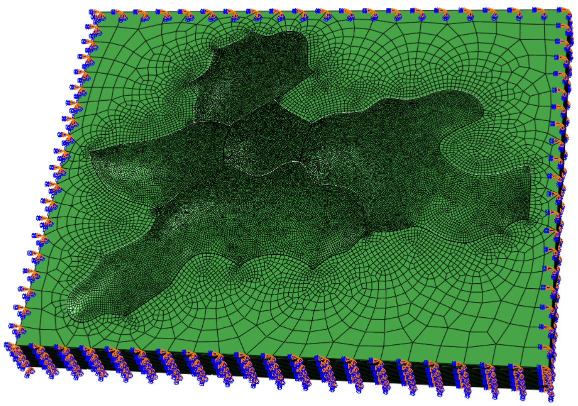
Simulation results: cut-view



Turgor pressure = 0.6 MPa
Material properties:
1. All the pavement cells: E = 600 MPa, ν=0.47
Relaxation time = 6.8s, G_i/G_0 = 0.15
2. Middle pectin and the surrending pectin:
E = 100 MPa, ν=0.47
Relaxation time = 6.8s, G_i/G_0 = 0.15

Extended Data Fig. 2J (INP file)

Assembly and boundary condition.



Turgor pressure = 0.6 MPa
Material properties:
1. All the pavement cells: E = 600 MPa, ν=0.47
Relaxation time = 6.8s, G_i/G_0 = 0.15
2. Middle pectin and the surrending pectin:
E = 100 MPa, ν=0.47
Relaxation time = 6.8s, G_i/G_0 = 0.15

Simulation results: (Cell 2 and 5 are hidden)

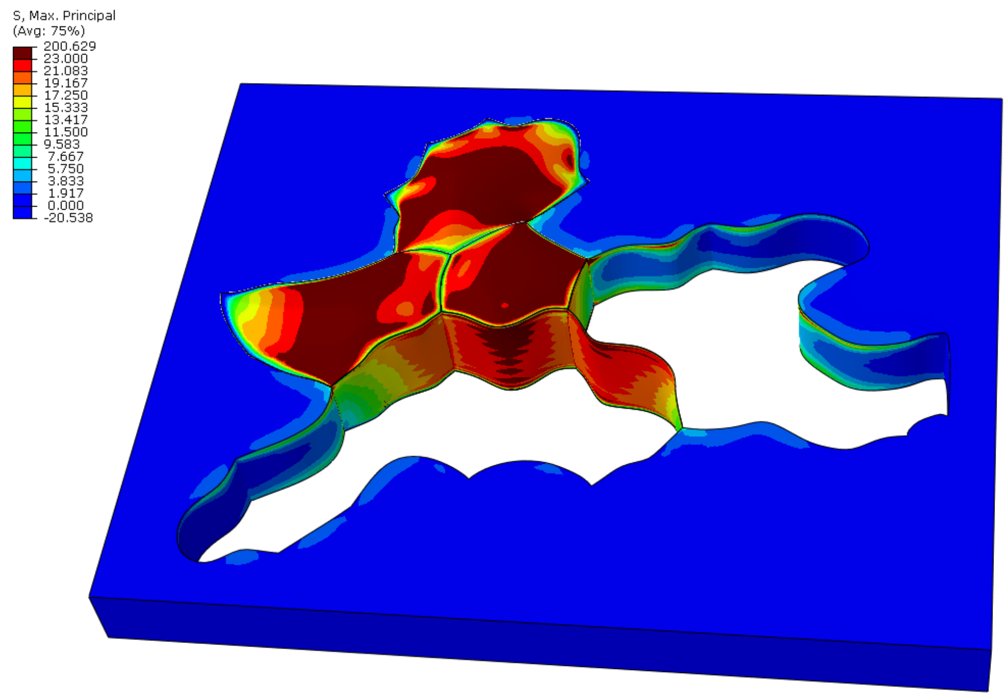
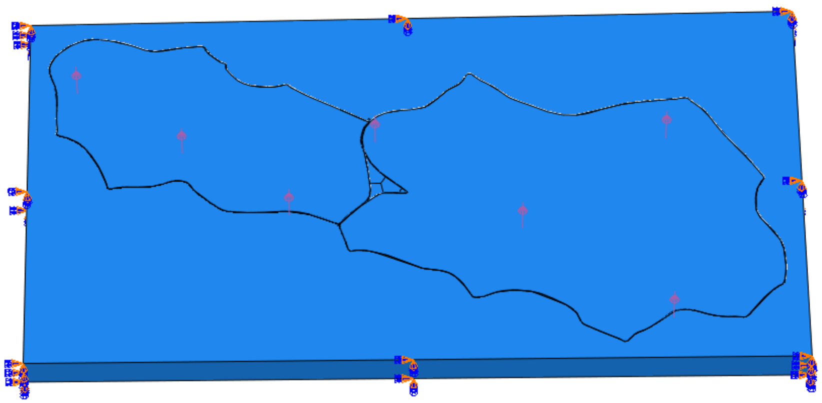


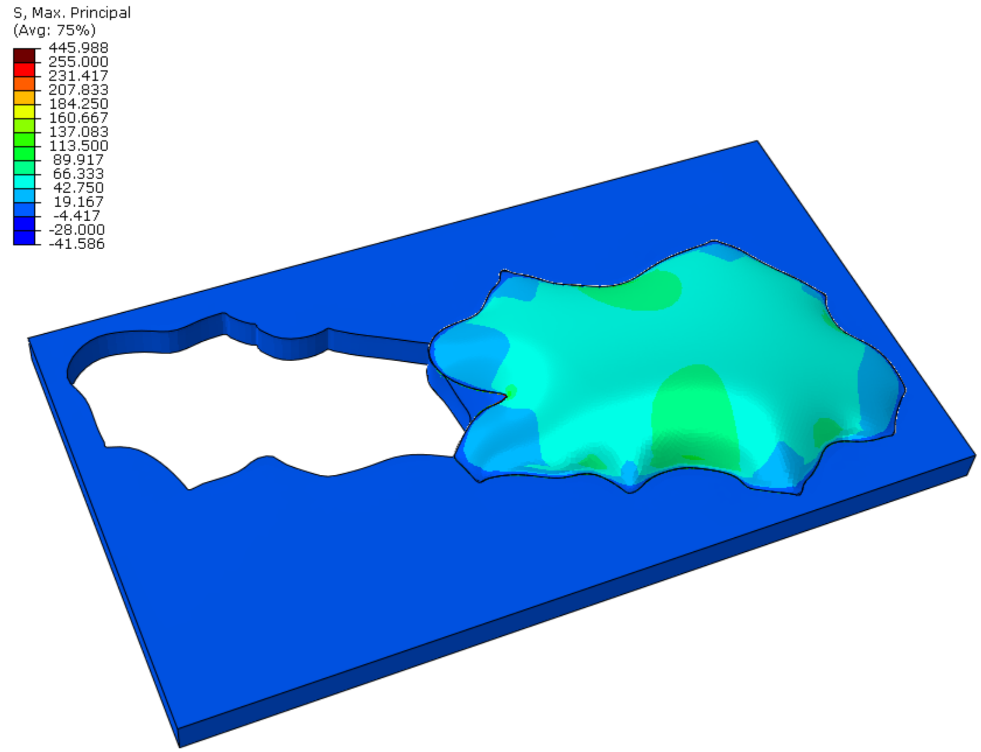
Fig. 6 furrow (INP file)

Assembly and boundary condition.



Turgor pressure = 0.5 MPa
Material properties:
1. All the pavement cells: E = 480 MPa, ν=0.47
Relaxation time = 6.8s, G_i/G_0 = 0.15
2. Middle pectin : E = 1 MPa, ν=0.47
2. Surrounding pectin : E = 100 MPa, ν=0.47

Simulation results: Cell 1 is hidden

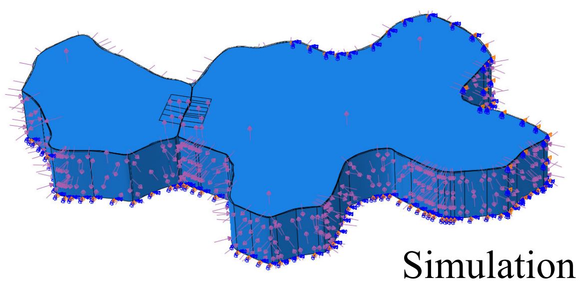


Extended Data Fig. 6 (INP file)

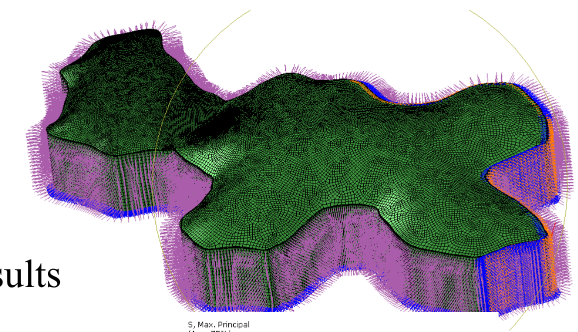
Turgor pressure = 0.6 MPa
Material properties:
1. All the pavement cells: E = 480 MPa, ν=0.47
Relaxation time = 6.8s, G_i/G_0 = 0.15
2. Surrounding pectin : E = 100 MPa, ν=0.47
3. Anisotropic patch: E1 = 2.4 GPa, E2=E3 = 240 MPa

Assembly and boundary condition.

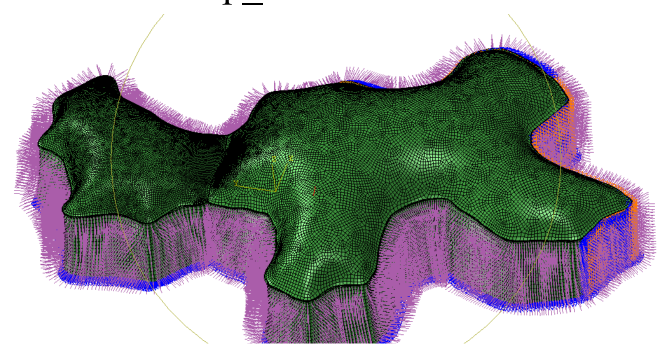
Step_0



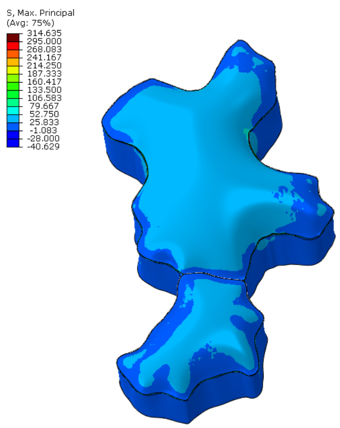
Step_1

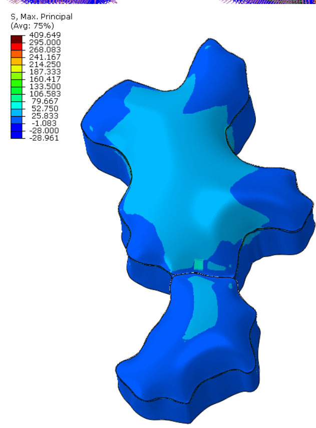


Step_2



Simulation results





cell 1 is hidden