
Revised page June 17, 2013. Correction: Cristian Pablo Pennisi is added as advisor.



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Title:

3D Deformation Design Study of Myoblast Cells

Semester:

10th Semester

Semester theme:

Master's thesis

Project period:

2012 - 2013

ECTS:

30

Supervisor:

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Participant(s):

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Number printed: 3

Pages: 55

Appendix: 10

Synopsis:

A cell deformation experiment is design to investigate whether muscle cells are susceptible to a particular type of deformation. Cells are seeded on a culture dish. A circular gel disk is fabricated, and it is placed on top of the cells. A spherical load indenter is design to impose controlled deformation to the cells. Deformation is imposed at the centre of the gel disk, and the deformations are transferred to the cells via the gel. Hereby, the gel undergoes axisymmetric straining. The gel stiffness is large compared to the cells, and hence the deformation of the cell is governed by the gel. The axisymmetric strain distribution at the cells' location is quantified by means of a numerical model. The gel constitution, applied in the numerical model, is determined by experimental tests, and test data are fitted to a proper material model. The simulation result shows a radial decay in the maximum shear strains. Since the cells are randomly positioned on the culture dish, they are strained differently depending on their location and their orientation. The cell viability is observed over time by use of a live-staining method and fluorescence microscopy. The experiments showed that cell viability decreased over a 24 h time period compared to a reference sample.