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**BADANIE WSTĘPNIE SPREŻONYCH MODELI KOMÓREK PRZY  
UŻYCIU ANALIZY WRAŻLIWOŚCI**

**A SURVEY OF TENSEGRITY MODELS OF CELLS WITH DESIGN  
SENSITIVITY ANALYSIS**

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It is believed that the mechanical environment that cells experience is very important to their behaviour [1]. A biological tissue made of a collection of cells can be modelled as a discrete system similar to a granular medium. We will investigate simple cell models belonging to the family of tensegrity bar structures [2]. To model a reasonable piece tissue i.e. visible without microscope we usually need millions of cells. A model of a single cell is an element of a system of millions of cells. We say "millions" because such models are possible to calculate with the available computers. The simplest model of such an elementary cell is given in Fig. 1.

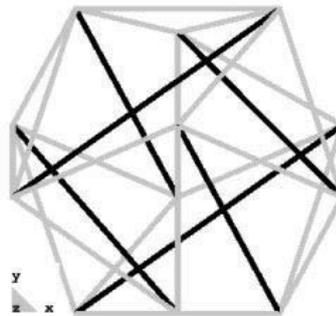


Fig. 1 Example of a tensegrity model of a single cell.

This is the icosahedron based tensegrity structure consisting of tendons (fair) and struts (dark) at first instance. The constitutive model for the bars is visco-elastic and includes the effects of finite strains assumption. It has been noticed [3] [4] that during the process of growth or death of the cells the state of stress in the tissue is changing.

It is interesting to know which elements of the cell are of high and lower importance. This can be done with the design sensitivity analysis [5]. We consider such design parameters as Young's moduli, cross sectional areas of bars and lengths of particular elements. We consider groups of design parameters as well. The analysis gives a hint which of the design parameters or elements of the cell influence the most and to which extend the tissue.

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