Simulation analysis of mimosa pudica main pulvinus towards biological tactile sensing modeling

ABSTRACT

This paper present simulation result on Mimosa Pudica main pulvinus towards exploration of potential of Mimosa Pudica plant as new biological sensing mechanism in tactile sensor and actuator. Previous study revealed that the movement of Mimosa Pudica leaf is due to the change of pressure between the upper and lower motor organ of main pulvinus. It symbolizes the unique examples in nature where engineering and botanical field can work together. From an engineering view, the turgidity changes capable of reversible shape changes, thus bringing the idea of sensing and actuating concept of a new tactile sensor. The idea is to fusion the artificial cell of Mimosa Pudica as the sensing mechanism for the new bio-inspired sensor. In this study, the movement of the main pulvinus has been modeled using Finite Element Method and the stress of three different diameter size has been obtained. The results show that different diameter size of the main pulvinus give almost the same impact on the stress obtains on the structure. In term of stress distribution, the diameter of main pulvinus is not a crucial part on this plant movement mechanism.

Keyword: Biological sensor; Bio-inspired; Bio-mimetic; Mimosa pudic