

Virtual deformation of soft tissue using bulk variables

We present an alternative online simulation model for human tissue. Online simulation of human tissue deformation during surgical training or surgical assistance is becoming increasingly important within the medical community. Unfortunately, even classical simulation models find human tissue to be computationally too costly for online simulation. In this paper, we simplify the complex biomechanical nature of human tissue within reasonable limits to develop a mathematical model which can be used for online simulation. This simplification is based on two principles; volume conservation and Pascal's Principle. Volume conservation is inherent to many organs in the human body due to the high concentration of blood (almost incompressible liquid) in them. Given an externally applied force, we use Pascal's Principle to obtain the global deformation vector at each time-step during simulation.