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Automated Bio-mechanical Modeling of the Human Breast Using the Finite Element Method ANDREW KYUNG, Northern Valley Regional HS at Demarest, JOO HEE LEE, The Stony Brook School — Creating a patient-specific modeling of the breast tissue is important in various biomechanical applications. FEM (Finite Element Method) is a numerical and computational tool that can be used to perform biophysics analysis as well as mathematical and engineering analysis. The FEM technique allows mesh generations of complex geometry to divide into smaller elements, such as triangles, quadrilaterals, and other two dimensional or three dimensional elements, to model a continuum or solid geometry. In this research, a 3D mesh was efficiently created for breast cancer imaging using FEM software. Pre-processing and post-processing mechanisms for automatic mesh generation of breast was implemented for the breast cancer imaging. In the discretization process, the mesh of the desired shape was created by filling the nodes in the mesh to create the present image for the biophysical analysis, and triangle elements with hyperelastic properties were used to model the surface of the breast. The results show that using the FEM software to model breast tissue led to great savings in computer running time, compared to manual construction. The efficiency of the FEM software was further emphasized for elements with irregular and complex geometry shapes.

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