CONSTITUTIVE MODELING OF PERICARDIUM

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A critical issue regarding mechanics of tissue heart valves concerns the determination of the constitutive model to be incorporated into the stress analysis. The objective of this work is to determine such a model for bovine pericardium.

Some models that have been developed for soft tissues and that represent the material behavior reasonably well for simple homogeneous deformations were selected from the literature. These models are hyperelastic and differ mainly in their treatment of anisotropy. Three models were implemented in a finite element code.

Tests that involve stress concentrations in the tissue were conducted and the resulting displacement fields were measured. The models were evaluated by comparing the predictions with experimental results for complex deformation states. Particular boundary value problems studied are the uniaxial stretching of a tissue with a central cut or circular hole.