

Fibre dispersion moderated elasticity of soft biological tissues

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The mechanical response of soft biological tissues is highly dependent on their microstructure, especially the arrangement of collagen fibres, which are responsible for the anisotropic nature and strength of the tissues. In this lecture the dispersed structure of collagen fibres will be highlighted, and models that account for the influence of dispersion on the elastic behaviour of arterial tissue will be discussed. These include the so-called angular integration (AI) model [1] and the generalized structure tensor (GST) model [2] and their comparison [3,4]. It is generally considered that in relatively low volume fractions the slender collagen fibres do not support compressive stresses and do not then contribute to the mechanical behaviour of the tissues. That exclusion of compressed fibres has a significant effect on stress predictions in such tissues is demonstrated, following [3,5] and references therein, and an efficient numerical scheme for accommodating this effect, developed in [5], is described.

References

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