



Dynamic Torsion Test for the Mechanical Characterization of Soft Biological Tissues

By Davide Valtorta

Cuvillier Verlag Mrz 2007, 2007. Taschenbuch. Book Condition: Neu. 207x144x12 mm. Neuware - In this thesis, a novel measurement method for the characterization of the mechanical properties of soft biological tissues is presented. The linear viscoelastic properties are determined through dynamic torsion tests by applying forced torsional oscillations to soft tissue samples. This work presents the definition of the measurement principle, with the design of torsional resonating sensors and the development of analytical and finite elements methods used for the inverse material characterization. The reliability and limitations of the proposed measurement technique have been assessed with experiments on soft biological materials as well as with synthetic materials. The viscoelastic response of soft materials is characterized for harmonic shear deformations at high frequencies (1-12 kHz) and small strains (up to 0.2% nominal strain for the soft biological tissues considered). Experiments are performed using a torsional resonating sensor, hereafter referred to as the torsional resonator device (TRD), which consists of a rod excited to vibrate at resonance, with one end in contact with a material sample. The resonating sensor induces shear waves in the material analyzed. Adherence between vibrating sensor and material sample is ensured by vacuum clamping in the contact area....



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