



LMS Seminar

16 February 2023 at 2:00 pm - Room Jean Mandel

Experimental findings and the beginning of explanations by modelling of particular Poisson effects encountered during traction of samples of the annulus fibrosus.

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ABSTRACT

Starting from field measurement analyses done during traction tests on the annulus fibrosus of the pig intervertebral disc (millimetric scale), I will expose particular transverse tensile behaviours (or "Poisson effects"). These behaviours are associated with Poisson's ratio values ranging from largely negative values (auxeticism) to very high values. These particular behaviours can only be partially reproduced by compressible hyperelastic models, which use macroscopic phenomenological modelling of compressible fibrous soft tissues. The weakness of these phenomenological models to reproduce the transverse tensile behaviour of this type of tissues invites us to propose micromechanical approaches, in particular the modelling of the architecture of collagen fibres. Estimating a macroscopic behaviour by homogenisation methods allows us to test certain hypotheses currently proposed in the literature in order to better understand the origin of these particular transverse behaviours. I will show that these macroscopic transverse behaviours, that can be experimentally measured through full-field measurements, can really help at discriminating different microstructures of collagen fibers.