

Mathematical Modelling of Biological Soft Tissues

Dr Tom Shearer AMIMA
(University of Manchester)

Thursday 5 October 2017, 6.00pm
Refreshments at 5.45pm

Frank Adams Room 1
Alan Turing Building
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Abstract Biological soft tissues, such as tendons and the skin, exhibit highly complex mechanical behaviour, and despite being made of the same fundamental materials, different soft tissues have radically different responses to applied loads. In this talk, I will explain how the mechanical properties of a soft tissue are directly linked to its micro-structure and how the geometrical arrangement of the collagen fibres that make up a tissue can give rise to surprising non-linear phenomena, even if the fibres themselves are assumed to behave linearly.

Finally, I will discuss how mathematical modelling could be used in the future to help design lab-grown soft tissues with specific mechanical properties that could be used to replace injured tissues in surgery.



X-ray computed micro-tomography images of the fibres within porcine patellar tendon and anterior cruciate ligament

The Speaker Tom Shearer, is a lecturer in Applied Mathematics and Materials Science at the University of Manchester. He completed his PhD thesis in 2012, on the effect of pre-stress on wave propagation in non-linear elastic materials, and since then he has worked on two EPSRC research fellowships, both in the area of mathematical modelling of ligaments and tendons.

He was jointly awarded the Catherine Richards Prize for the best article in *Mathematics Today*. The winning article, jointly authored by Dr Philip Pearce and Dr Tom Shearer, was *Maths in Medicine; How to survive a Science Fair*, and was published in June 2016.

For further information, please contact Margaret Eastwood m.eastwood@mmu.ac.uk

No charge is made to attend meetings. Non-IMA members are welcome.