
Generalised continua in biomechanics : from multi scale tissues to biomechanical metamaterials

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Abstract

Biological tissues have mechanical and functional properties that are extremely difficult to replicate. They are intrinsically multi-scaled, micro-structured and heterogeneous materials, and their exceptional features are the result of a clever arrangement of the basic constituents of the tissue, at different scales. The characteristics of natural materials have always inspired engineers in the conception of artefacts, and recently, thanks to the progresses in production engineering these concepts have been applied for designing the so-called bio-inspired materials. In this talk it will be shown how tools and methodologies initially used in the field of meta-materials can be extended to the design of biomimetic artificial tissues. This will allow to i) **improve the accuracy of optimisation algorithms** for architected artificial tissues, and ii) take advantage of scale transitions to **enhance the mechanical properties of the implants** and to **improve characterisation and diagnostics**

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