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Topological Shear Stress Optimisation of Micro-CT Based Scaffolds

Henrique A. Almeida, Paulo J. Bártolo

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Additive manufacturing technologies are being used to fabricate scaffolds with controlled architecture for tissue engineering applications. These technologies combined with computer-aided design systems enable to produce three-dimensional structures layer-by-layer in a multitude of materials. Actual prediction of the effective mechanical properties of scaffolds produced by Additive manufacturing systems, is very important for tissue engineering applications. One of the existing computer based techniques for scaffold design is topological optimisation. The goal of topological optimisation is to find the best use of material for a body that is subjected to either a single load or a multiple load distribution. This paper proposes a topological optimisation scheme based on existing micro-CT data in order to

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of the scaffold during the topological optimisation process. This particular topological optimisation scheme uses the surface boundaries to produce novel models with different characteristics, which are different from the initial micro-CT models. This approach enables to produce valid biomimetic scaffold topologies for tissue engineering applications.

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