Editorial

The second half of 2009 is rich in international events in virtual and physical prototyping, a quite active and relevant research field. The *Virtual and Physical Prototyping* journal is associated with two of these events. The first one is the ECCOMAS Thematic Conference on Tissue Engineering designed to be a major international forum for the discussion of the current state-of-the-art in the fields of Tissue Engineering Modelling and Simulation. This Conference will focus on:

- understanding the fundamentals of tissue engineering;
- modelling and characterisation of scaffolds for tissue engineering;
- modelling the relationship between scaffold, cell attachment, proliferation and differentiation;
- design and development of scaffolds for tissue engineering;
- fabrication and testing of scaffolds for tissue engineering;
- cell signalling;
- computational bone mechanics.

The second event is the 4th International Conference on Advanced Research in Virtual and Physical Prototyping (VR@P 2009), a core forum for the scientific exchange of multi-disciplinary and inter-organisational aspects of virtual and rapid prototyping and related areas. This conference covers a wide range of topics like biomanufacturing, materials for rapid prototyping, advanced rapid prototyping technologies, rapid tooling and manufacturing, collaborative design and engineering, CAD and 3D data acquisition technologies, etc. It gathers a broad research community, strongly engaged in the development of innovative solutions to resolve industry's problems, contributing to improve the health and quality of life. Reports of these Conferences will be published in the next issues of the *Virtual and Physical Prototyping* journal.

This issue of *Virtual and Physical Prototyping* presents five papers spanning from shrinkage compensation to organ printing state-of-the-art original research, with authors and co-authors from China, India, Thailand and the USA.

The first paper by Pandey presents a shrinkage model and a shrinkage compensation scheme for selective laser sintering. The shrinkage model considers the effect of both part geometry and beam offset. The shrinkage compensation model accounts for nonlinear shrinkage, compensating shrinkage for individual hatch length.

In the second paper entitled "Designer blueprint for vascular trees: morphology evolution of vascular tissue constructs", Mironov *et al.* explore the concept of organ printing, a variant of the biomedical application of rapid prototyping of 3D tissue and organ constructs using self-assembled tissue spheroids as building blocks. Tissue retraction coefficients during the tissue fusion process and associated geometrical reconfigurations of individual tissue spheroids and tissue constructs were experimentally evaluated and compared with theoretical calculations. The formula for estimating the optimal number of tissue spheroids for biofabrication of ring-like and tubular-like segmenta structures of a vascular tree of desirable final diameter is also deducted. These data enables to design optimal CAD bioprinted branched vascular trees of desirable geometry and size.

Soonanon and Koomsap describe a layer-based geometrical reconstruction tool "towards direct transformation of orthographic-view drawings into a prototype". This tool enables the transformation of engineering drawings into physical prototyping objects using additive fabrication technologies, by translating 2D drawings into a set of contours.

The fourth paper, "Fractal raster tool paths for layered manufacturing of porous objects" is introduced by Kumar *et al.* This paper describes an approach for additive fabrication objects with controlled porosity using an appropriate modelling scheme, a pre-processing algorithm for slicing and a raster tool path generation methodology using space-filling fractal curves of porous models.

Last, but not least, Huang *et al.*, look to the use of the radius angle histogram method to retrieve 3D engineering models. To improve retrieval efficiency and precision, an improved radius angle histogram method is proposed. In the proposed approach, the normalised model coordinates are first established by principal component analysis. Local features in each quadrant are then extracted and the similarity of the local features is ascertained.

We trust you will enjoy this issue.

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