1.9.23. ANALYSIS AND EXPLORATION OF CT-DATA USING APPLICATION SPECIFIC MULTI-DIMENSIONAL TRANSFER FUNCTIONS

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The growing number of technical application for computed tomography (CT) has increased the need for application specific analysis of CT data. In this paper an analysis chain is presented, that builds on an interactive, visualisation-driven approach for the analysis of certain properties of the object under investigation. In that way, the domain expert can easily adopt the procedure to changing conditions of the analysis task or the acquisition and reconstruction of the CT-data at hand.

A visualisation-driven approach offers the advantage that the expert user can control which features to include in the analysis. To implement such a procedure multi-dimensional transfer functions were chosen for the exploration. For the present paper the concept of novel feature size transfer functions in 2D and 3D was further developed. New application specific multi-dimensional transfer functions are applied to efficiently analyse and quantify specific features in a sample volume.

In two application scenarios the novel workflow using the analysis chain is shown. The first scenario deals with the orientations of fibres in Steel Fibre Reinforced Sprayed Concrete (SFRSpC). The orientations of the steel fibres and their distribution, depending on the concrete's application direction, are analysed and quantified. This is a crucial step in assessing the material's behaviour under mechanical stress, which is still in its infancy and therefore an important topic in the building industry.

The second application scenario is the designation of the microstructure of ductile cast irons with respect to the contained graphite. This corresponds to the requirements of the ISO standard 945-1, which deals with 2D metallographic samples. We illustrate how the necessary analysis steps can be conducted efficiently using the analysis chain for 3D volumes.

Overall, we show that a visual approach with custom transfer functions in specific application domains offers significant benefits and has the potential of greatly improving and optimizing the workflows of domain scientists and engineers.