Porosity Maps – Interactive Exploration and Visual Analysis of Porosity in Carbon Fiber Reinforced Polymers

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Abstract

In this work a novel method for the characterization of porosity in carbon fiber reinforced polymers (CFRP) is presented. A visualization pipeline for the interactive exploration and visual analysis of CFRP specimens is developed to enhance the evaluation workflow for non-destructive testing (NDT) practitioners based on specified tasks. Besides quantitative porosity determination and the calculation of local pore properties, i.e., volume, surface, dimensions and shape factors, we employ a drill-down approach to explore pores in a CFRP specimen. We introduce Porosity Maps (PM), to allow for a fast porosity evaluation of the specimen. Pores are filtered in two stages. First a region of interest is selected in the porosity maps. Second, pores are filtered with parallel coordinates according to their local properties. Furthermore a histogram-based best-viewpoint widget was implemented to visualize the quality of viewpoints on a sphere. The advantages of our approach are demonstrated using real world CFRP specimens. We are able to show that our visualization-driven approach leads to a better evaluation of CFRP components than existing reference methods.

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