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Using digital image corelation in assessment of anisotropy of strength properties of 3D printed specimens

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With 3D printing technology research accelerating year by year and with increasing number of applications of adaptive manufacturing in final products, engineers face the problem of having access to realiable design codes for elements manufactured with those new technologies. By the very nature of the 3D printing technology, manufactured elements are characterized by high degree of anisotropy of strength properties. The aim of the presented research is to establish reliable testing protocol for assesment of anisotropy of mechanical behaviour and to create data bases of experimental results for validation and calibration of numerical models. Besides traditional experimental techniques, new techniques based on Digtal Image Correlation (DIC) and in house developed software are incorporated into the experimental pipeline. In the presented research relatively, simple test cases of specimens under uniaxial tension and compression were analyzed. That allowed for simpler correlation of results from strength testing machine, DIC analysis and simple mechanical model, as well as clearly showed anisotropy effects. The rough surface of printed specimens turned out to be ideal for DIC measurements. The results obtained can be used to calibrate numerical models before testing more complex cases.

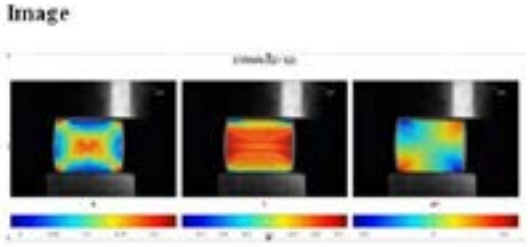

Figure 1: Specimen in compression test with superimposed strain maps obtained by DIC.

Biography

Katarzyna Czwakiel has obtained her MSc in Civil Engineering at Cracow Univeristy of Technology, Poland. In 2017 she has joined Chair of Building Materials Engineering, where she carries research towards her PhD under the supervision of Prof. Izabela Hager. Her research interest includes: 3D printing, building materials, strength of materials.

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