

A Preliminary Digital Image Correlation Study of the Anisotropic Mechanical Properties of a 3D-Printed Mortar

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Abstract – The anisotropic mechanical properties of an additive-manufactured (“3D-printed”) mortar was evaluated in this study. A box geometry was printed and then sections were cut to produce beams for flexural testing in four orientations. The results demonstrate that there is a clear anisotropy in the flexural strength of 3D-printed mortar as a function of loading direction relative to the orientation of the print direction. For the mix in this study, a beam unit weight criterion was established to separate fully dense specimens from those with interior and/or exterior printing defects. Finally, preliminary digital image correlation results are presented, which demonstrate the usefulness of the technique for observing localized strain concentrations, such as generated at printing interfaces or defects.

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