Vision and Strategies for Reinforcing Additively Manufactured Concrete Structures
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Strategies for Integrating Straight Rebar in 3DCP Columns and Shear Walls

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Abstract. 3D Concrete Printing (3DCP) is one of the most used digital fabrication processes with concrete as it allows the shaping of concrete into freeform geometries that optimize material use without the need for formworks. Despite the recent advancements of the technology, incorporating reinforcement remains one of its main shortcomings that obstruct it from being used in structural applications. The presented work proposes a diagonal grid of intersecting straight rebars as a reinforcement strategy for 3DCP. By acting as a guide for reinforcement in two directions, the resulting diagrid lattice offers structural efficiency and takes advantage of the geometric freedom of the fabrication process to integrate open channels during printing. Those can serve either as formwork for casting structural concrete or as channels for post-tensioning. The building components use less amount of concrete overall together with linear, inexpensive rebars. This design strategy was tested in a series of columns and a wall element and could be further extended to slabs. From a structural standpoint, the materialized prototypes should be tested and evaluated against existing structural systems for reinforced concrete.

Keywords: Digital Concrete, 3DCP, reinforcement

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Competing interests

The authors declare no competing interests.

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