

Additive Manufacturing of Overhangs: From Temporary Supports to Self-Support

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Abstract : The objective of this study is to propose an interactive design environment that outlines the underlying computational framework to reach self-supporting overhangs. The research demonstrates the digital printability of overhangs taking into consideration factors related to the geometry design, the material used, the applied support, and the printing set-up of slicing and the extruder inclination. Parametric design tools can contribute to the design phase, form-finding, and stability optimization of self-supporting structures while printing in order to hold the components in place until they are sufficiently advanced to support themselves. The challenge is to ensure the stability of the printed parts in the critical inclinations during the whole fabrication process. Facilitating the identification of parameterization will allow to predict and optimize the process. Later, in the light of the previous findings, some guidelines of simulations and physical tests are given to be conducted for estimating the structural and functional performance.

Keywords : additive manufacturing, overhangs, self-support overhangs, printability, parametric tools

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