

GASTVORTRAG

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Bimaterial 3D printing optimization

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Abstract:

Three-dimensional printing, or 3D printing, is an additive process for rapid free form manufacturing, where the final component is created by the addition of successive layers of material. Each layer is a cross-section of the new component, thus the printer draws it as in 2D. Several improvements have been made to 3D printing methods and nowadays this type of printers has become fairly popular. Composite multi-material components are increasingly sought in several markets. Such components allow for the shrinking of systems, operation and build simplification, with improved reliability of the associated functions.

This talk addresses the construction of hybrid parts through the use of an additive process that adds polymer resin to another pre-existing structure (metallic, polymeric, ceramics, or of another material). The existence of a grid that supports the polymer brings additional difficulties, due to the shaded areas that may be formed on the surface of the polymer. This issue is handled by installing additional light emitters on the walls of the printer. Two types of emitters are considered: galvanometer mirror systems that project the laser light, or Digital Light Processing projectors. The resulting problems are solved in two phases. First, the problem of locating light emitters capable of reaching all cells of the polymer of the part to print is analyzed. Second, the selected emitters are assigned with the areas of the polymer to reach. Algorithmic methods for the problems will be described and discussed.