

## عنوان مقاله:

A Nonlinear Error Compensator for FDM 3D Printed Part Dimensions Using a Hybrid Algorithm Based on GMDH Neural Network

## محل انتشار:

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## خلاصه مقاله:

Following the advances in Computer-Aided Design (CAD) and Additive Manufacturing (AM), with regards to the numerous benefits of the Fused Deposition Modeling (FDM) as a popular AM process, resolving its weaknesses has become increasingly important. A serious problem of the FDM is the dimensional error or size difference between the CAD model and the actual 3D printed part. In this study, the approach is compensating the error regardless of its source. At First, all parameters affecting the dimensional accuracy of FDM are comprehensively identified. Then, multi-input–single-output (MISO) data is prepared by designing experiments using the Taguchi method and obtaining the results from 3D printed samples. Next, a GMDH neural network is applied, which uses a simple nonlinear regression formula in each neuron but can create very complex neuron combinations. So, it is possible to analyze small or even noisy data. Regulatory parameters of the Neural Net have been optimized to increase efficiency. The case study shows a decrease in the RSME for the Nominal CAD Model from ۰.۳۷۷ to ۰.۰۳۳, displaying the compensator's efficiency.

## کلمات کلیدی:

Additive Manufacturing, Fused Deposition Method, Error Compensation Model, GMDH Neural Network

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