

عنوان مقاله:

Fused Deposition Modeling of an Aircraft Wing using Industrial Robot with Non-linear Tool Path Generation

محل انتشار:

ماهنامه بین المللی مهندسی، دوره 34، شماره 1 (سال: 1400)

تعداد صفحات اصل مقاله: 11

نویسندگان:

A. Sri Harsha - *Department of Mechanical Engineering, Jawaharlal Nehru Technological University Anantapuramu, Ananthapur Dt., Andhra Pradesh, India*

Ch R. Vikram Kumar - *Department of Mechanical Engineering, N.B.K.R.I.S.T., Vidyanagar, Nellore Dt., Andhra Pradesh, India*

خلاصه مقاله:

Fused Deposition Modelling (FDM) is an additive manufacturing process to build 3D objects on a horizontal plane from bottom to top. In the conventional FDM process, the printing of curved objects causes the staircase effect and results in poor surface finish. In this work, the FDM process integrated with a 6-DOF Industrial robot is used to print the curved objects by generating non-linear tool paths to avoid the staircase effect. A standard NACA 0015 aircraft wing having curved surfaces is printed without staircase effect at a uniform deposition rate using an industrial robot. The wing is sliced into concentric curved layers either in the form of convex or a concave shape. A new methodology is developed by combining the non-linear toolpaths with the change in extruder orientation to print curved objects at a uniform deposition without any staircase effect. ABB Robotstudio simulation software is used for simulating the printing process and simulation results are validated by printing the portion of the wing using the Industrial robot with an FDM extruder as an end effector. The experimental results showed that the aircraft wing is printed successfully with uniform deposition at constant velocity without any staircase effect.

کلمات کلیدی:

Additive Manufacturing, Fused Deposition Modelling, Industrial Robot, Robotics, Three Dimensional Printing, Toolpath generation

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