

IAF MATERIALS AND STRUCTURES SYMPOSIUM (C2)
Interactive Presentations - IAF MATERIALS AND STRUCTURES SYMPOSIUM (IP)

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CONTROLLING HEAT FLOW DURING ADDITIVE MANUFACTURE TO IMPROVE STRUCTURAL
PERFORMANCE

Abstract

Until the advent of additive manufacture, functionally graded materials (FGMs) were extremely difficult to produce. While the material mechanisms in many FGMs are still unknown, additive manufacture gives a basis for production. The heat flow through the part as it is being manufactured is a process which needs extra focus, however. This paper demonstrates the use of a methodology which combines Python™ code for producing FGMs along with Python™ code for plotting heat flow through the part as it is being produced. The code takes numerous variables including conductivities, film coefficients and deposition temperatures of materials, temperatures of the heat bed and the surrounding environment and nozzle velocity of the print head. The outputs of the heat flow simulation are used to assess if the FGM part needs redesign in any areas due to temperature spikes in any region. The methodology is shown tested on a subsection of an interface for transferring thermal and mechanical loads between space robotic apparatus.