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Dynamic characterization of anisotropy effects in 3-D printed materials for high-G survivability. VASANT JOSHI, COLIN QUALTERS, EZRA CHEN, Naval Surface Warfare Center Indian Head Explosive Ordnance Disposal Technology Division, Indian Head, MD 20640, JAIME SANTIAGO, Naval Surface Warfare Center, Carderock Division, 9500 Macarthur Blvd, Bethesda, MD 20817 — The behavior of dedicated 3-D printed structures for survivability of encapsulated electronic components subject to high-G impact is currently being investigated. Understanding the material characteristics, based on printing layout and build orientation is especially important when considering structural application of 3-D printed parts. While 3 D printing allows fabrication of intricate geometries not amenable to traditional machining or molding methods, prediction of its damping characteristics becomes impossible without modeling and simulations. Accurate modeling parameters need both static and dynamic characterization of 3-D printed materials. A combination of experiments conducted for characterization of Vero White Plus (acrylic), Tango Black (rubber) and mixtures of these (Vero rich and Tango rich) materials used conventional tensile and compression tests, Hopkinson bar, dynamic material analyzer (DMA) and a non-conventional accelerometer based resonance test with spectrum analysis method of obtaining high frequency data. In this paper, experimental results of parent materials and their mixtures in context of 3-D printing orientation and print build direction (layers) of the material and their influence of modeling parameter generation are presented.

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