Electrical properties of conductive polymers under stress

Statement of the Problem: With the growing field of application of composites as replacements for hitherto metallic applications, the need for conductive polymers has increased. In fact, although composites can often replace metals with gains in weight, some applications require electrical conductive properties. Metallic films and grids have been envisaged and sometimes applied, but the high density of metals still imposes a significant increase in weight. The use of electrically conductive polymers might provide an interesting solution, but there is scarce information about the electrical behavior of such polymers when included in structural members. Additive manufacturing is a technology that enables the construction of graded materials. The specimens where built with layers in conductive PLA and regular PLA. The purpose of this study is to describe the tests and results obtained while measuring the electrical conductivity of polymers under stress.

Methodology & Theoretical Orientation: Electrical resistance of specimens was measured under different load conditions. The specimens were obtained by fusion deposition modeling; since this process delivers non-isotropic parts, the influence of manufacture process parameters was also tested. Specimens were tested for uniaxial and bending behavior.

Findings: A database of values of the electrical conductivity of the studied polymers was obtained and the influence of the manufacture parameters on this property was studied.

Recent Publications


Biography

Antonio Ribeiro is an Assistant Professor in the Mechanical Engineering Department at the Instituto Superior Tecnico, lecturing several courses in the Mechanical Design and Structural Materials Scientific Area. He has completed his PhD in Mechanical Vibrations at the University of Lisbon. His main studies are focused “On holistic approaches to engineering design and additive manufacturing”.

relogio.ribeiro@tecnico.ulisboa.pt