Design, Analysis, Fabrication and Testing of Strain-Gauged Extensometer

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ABSTRACT

This study is mainly aimed at the design, analysis, fabrication, and testing of a strain-gauged extensometer normally required on a mechanical tensile or compressive test. First of all, an elastic sensing member, which utilizes the properties of a cantilever beam, is designed and subjected to finite element analysis using the commercial software COSMOSWORKS. Strain gauges are designed to be bounded on the appropriate locations of the members to form a full Wheatstone bridge. In order to obtain an output voltage as large as possible to ensure the measuring accuracy of this extensometer, different sets of design dimensions of the beam are taken for analysis. The stress limit is considered, and the final dimensions are determined. An extensometer is then fabricated and tested. The test data show that the results obtained based on the finite element analysis are consistent with the test results.

Keywords : strain-gauge, extensometer, finite element, cantilever beam, Wheatstone bridge

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