

Biaxial tensile analysis in a high tenacity polyester fabric

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Abstract

The biaxial test is essential for measuring the mechanical properties of anisotropic composite materials such as structural membranes (yarns and coating), where the material properties are a function of the orthotropic stress state. Those membranes comprise a woven cloth that is then coated, to protect the yarns of the fabric from environmental degradation, and to enable joining. The yarns are made of fibrils, formed into bundles, and then twisted. They are woven to form the base cloth, with the weave pattern and yarn tensions variables within this manufacturing process. The base cloth is coated on both sides. The coating medium permeates the base cloth. Both the coating and yarns have nonlinear characteristics. When the textile is loaded, the coated base cloth changes geometry, adding geometric nonlinearity.

There are also fewer than ten biaxial test machines worldwide. The work was carried out with biaxial tensile tests in Brazil in a high tenacity polyester fabric. Deformation was measured with a Digital Image Correlation (DIC) equipment through the registration and image tracking. The test protocol used was based in the European Standard EN17117 [1] and Japanese Protocol [2] adding some load ratios.

Keywords: Textile Membranes. Biaxial Tensile Test. Membrane Structures.

References

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