

Experimental Characterization of Anisotropic Mechanical Properties of Textile Woven Fabric

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Abstract : This paper presents an experimental characterization of the anisotropic mechanical behavior of 4 textile woven fabrics with different weaves (Twill 3, Plain, Twill4 and Satin 4) by off-axis tensile testing. These tests are applied according seven directions oriented by 15° increment with respect to the warp direction. Fixed and articulated jaws are used. Analysis of experimental results is done through global (Effort/Elongation curves) and local scales. Global anisotropy was studied from the Effort/Elongation curves: shape, breaking load (Frup), tensile elongation (EMT), tensile energy (WT) and linearity index (LT). Local anisotropy was studied from the measurement of strain tensor components in the central area of the specimen as a function of testing orientation and effort: longitudinal strain ϵ_L , transverse strain ϵ_T and shearing ϵ_{LT} . The effect of used jaws is also analyzed.

Keywords : anisotropy, off-axis tensile test, strain fields, textile woven fabric

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