

Influence of specimen pre-shear and wrinkling on the accuracy of uniaxial bias extension test results

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Key Words: *Engineering Fabrics, Forming Mechanics*

The influence of unintended specimen pre-shear and out-of-plane wrinkling on the accuracy of shear angle and axial force results, measured during a uniaxial bias extension (UBE) test on engineering fabrics, is examined. Three techniques of measuring test kinematics are investigated, including manual image analysis, 2-D and 3-D full-field analysis. Error introduced by specimen pre-shear is shown to influence test results in different ways, depending on analysis technique. Procedures to take specimen pre-shear error into account when interpreting results are demonstrated, though an important recommendation resulting from this investigation is to minimise pre-shear as much as possible. Out-of-plane wrinkling is shown to create significant errors in kinematic data when using 2-D analysis methods (up to 20% overestimates of measured shear angle). It is shown that wrinkle-error can be corrected if 3-D stereoscopic analysis methods are employed.