SM13L_12818

XXI International Congress of Theoretical and Applied Mechanics
Warsaw, Poland, August 15–21, 2004

Study of the Usability of Various Cruciform Geometries for Biaxial Testing of Fiber Reinforced Composites

Arwen Smits[(1)], D. Van Hemelrijck[(1)], T. Philippidis[(2)], A.M. van Wingerde[(3)], A. Cardon[(1)]

(1) *Department of Mechanics of Materials and Constructions (MeMC), Vrije Universiteit Brussel, Brussels, Belgium*
(2) *Department of Mechanical Engineering & Aeronautics, University of Patras, Patras, Greece*
(3) *Wind Turbine Materials and Constructions, Knowledge Centre WMC, Wieringerwerf, The Netherlands*

Experimental investigation of fibre reinforced composites was predominantly performed using uniaxially loaded specimens. However, in real applications composites are often loaded in more directions. Consequently, experimental investigation of these materials should consider biaxial tests. For this reason a biaxial testing facility for planar cruciform specimens was developed at the Free University of Brussels. A valid biaxial test avoids premature failure in the uniaxially loaded arms and gives a large region of uniform strain in the biaxially loaded zone. These conditions are not easily obtained and so the design of a suitable cruciform geometry is the subject of this paper. Finite element simulations in combination with experiments on different geometries, led to the selection of a suitable geometry with a reduced thickness in the central region of the specimen in combination with a rounding radius between two arms inside the material. In that way failure occurs in the biaxially loaded zone.

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