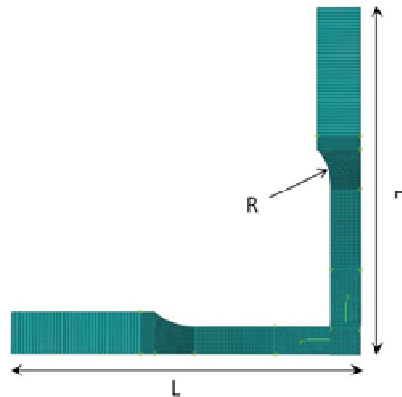


Design of a cruciform polymer specimen for biaxial tests



The experimental investigation of the inner core of a composite layered material is important for determining the final mechanical behavior of the composite on itself. Such a characterization is commonly done by means of simple tests, like uniaxial tensile tests, that allow the identification of the main mechanical parameters. If submitted to complex stress fields, the polymer material can show different properties, which are generally not possible to be obtained by standard tests. In that perspective it is interesting to perform biaxial tensile tests.

Task

Mr. Frank Fiedler should design a cruciform specimen made out of Polypropylene (PP) – Polyethylene (PE) foil, in order to perform biaxial tensile tests by means of the testing machine developed and available in the laboratory of the Institute of Applied Mechanics. The following scientific literature is firstly taken into account (Melchior, 2012; Smits, 2006; Yu, 2002). A preliminary identification of some material parameters will be performed, considering the experimental evidence of monotonic tensile tests on PP-PE foil specimens. The shape of the arms and the central region of the specimens will be optimized by performing FE simulations within the program framework of Abaqus. The final objective is to obtain a shape of the specimen able to develop a uniform distribution of stresses in the center of the polymer specimen under plane biaxial loading conditions.

Literatur

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Smits, A.; et al (2006). *Design of a cruciform specimen for biaxial testing of fibre reinforced composite laminates*, Composites Science and Technology 66.

Yu, Y. (2002). *Design of a cruciform biaxial tensile specimen for limit strain analysis by FEM*, Journal of Materials Processing Technology 123.

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