Experimental and Numerical Modeling of Hemp–Polyester Composites

D.S. Chethan, G.S. Venkatesh, Gunti Ranga Srinivas and C.S. Vinod Kumar

Abstract In this study, hemp–polyester composites were prepared with two volume fraction of hemp fibers and characterization for tensile properties. The mechanical characterization provided the quantitative insights into the elasto-plastic behavior of hemp–polyester composites. Young's modulus, yield strength, ultimate tensile strength and failure strain were obtained by testing the specimens in a uniaxial testing machine. Tensile strength and modulus of the composites were superior in the composites with higher volume fraction of hemp. The numerical modeling was then performed to simulate the constitutive behavior through out nonlinear range of hemp–polyester composite and study the effect of volume fraction of fibers/matrix on mechanical properties. Finite element model calibration was done to establish the validity of the modeling procedures and accuracy of prediction by comparing the numerical results with experimentally determined results. Understanding the elasto-plastic behavior through experimental and numerical simulations is considered to be a more viable tool for analyzing products made of hemp–polyester composites for possible use in automotive and other industrial applications in advanced simulations.

Keywords Composites · Hemp · Hemp–polyester composites · Finite element analysis · Numerical modeling

D.S. Chethan · G.S. Venkatesh (✉)
Visvesvaraya Institute of Advanced Technologies, VTU-CPGS,
Bengaluru Region, Muddenahalli, Chikkaballabur (Dist), India
e-mail: gsvenkatesh@vtu.ac.in

G.R. Srinivas
Center for Product Design and Manufacturing, Indian Institute of Science,
Bengaluru, India

C.S. Vinod Kumar
Department of Mechanical Engineering, Acharya Institute
of Technology, Bengaluru, India

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