

Mechanical characterisation of lignocellulosic fibres using toy bricks tensile tester

ABSTRACT

This paper demonstrates the potential use of toy-bricks as the building block of a mechanical tensile testing instrument for the mechanical characterisation of natural fibres. A table-top tensile testing instrument was developed using LEGO parts (Mindstorms EV3 and Technics) and a 2 kg capacity load cell, whereas deformation modes were programmed in an open source programming language. Experimental work was conducted on oil palm fibres under different tensile modes (i.e. constant deformation, triple-twisted-tension and deformation-relaxation modes), which showed anisotropic-viscoelastic behaviour, and microstructural damages due to deformation.

Keyword: Toy-bricks tensile tester; Anisotropic viscoelastic; Lignocellulosic fibres