

Controlled retting of hemp fibres: Effect of hydrothermal pre-treatment and enzymatic retting on the mechanical properties of unidirectional hemp/epoxy composites - DTU Orbit (09/11/2017)

Controlled retting of hemp fibres: Effect of hydrothermal pre-treatment and enzymatic retting on the mechanical properties of unidirectional hemp/epoxy composites

The objective of this work was to investigate the use of hydrothermal pre-treatment and enzymatic retting to remove non-cellulosic compounds and thus improve the mechanical properties of hemp fibre/epoxy composites. Hydrothermal pre-treatment at 100 kPa and 121 °C combined with enzymatic retting produced fibres with the highest ultimate tensile strength (UTS) of 780 MPa. Compared to untreated fibres, this combined treatment exhibited a positive effect on the mechanical properties of hemp fibre/epoxy composites, resulting in high quality composites with low porosity factor (α_{pf}) of 0.08. Traditional field retting produced composites with the poorest mechanical properties and the highest α_{pf} of 0.16. Hydrothermal pretreatment at 100 kPa and subsequent enzymatic retting resulted in hemp fibre composites with the highest UTS of 325 MPa, and stiffness of 38 GPa with 50% fibre volume content, which was 31% and 41% higher, respectively, compared to field retted fibres.

General information

State: Published

Organisations: Department of Chemical and Biochemical Engineering, Center for BioProcess Engineering, Department of Wind Energy, Composites and Materials Mechanics, Technical University of Denmark, Swedish University of Agricultural Sciences

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Pages: 253–262

Publication date: 2016

Main Research Area: Technical/natural sciences

Publication information

Journal: Composites Part A: Applied Science and Manufacturing

Volume: 88

ISSN (Print): 1359-835X

Ratings:

BFI (2017): BFI-level 2

Web of Science (2017): Indexed yes

BFI (2016): BFI-level 2

Scopus rating (2016): CiteScore 4.82 SJR 1.402 SNIP 2.053

Web of Science (2016): Indexed yes

BFI (2015): BFI-level 2

Scopus rating (2015): SJR 1.53 SNIP 2.18 CiteScore 4.09

Web of Science (2015): Indexed yes

BFI (2014): BFI-level 2

Scopus rating (2014): SJR 1.67 SNIP 2.538 CiteScore 4.08

BFI (2013): BFI-level 2

Scopus rating (2013): SJR 1.59 SNIP 2.828 CiteScore 3.92

ISI indexed (2013): ISI indexed yes

Web of Science (2013): Indexed yes

BFI (2012): BFI-level 2

Scopus rating (2012): SJR 1.559 SNIP 2.706 CiteScore 3.36

ISI indexed (2012): ISI indexed yes

Web of Science (2012): Indexed yes

BFI (2011): BFI-level 2

Scopus rating (2011): SJR 1.443 SNIP 2.499 CiteScore 3.23

ISI indexed (2011): ISI indexed yes

BFI (2010): BFI-level 2

Scopus rating (2010): SJR 1.553 SNIP 2.241

BFI (2009): BFI-level 2

Scopus rating (2009): SJR 1.536 SNIP 1.976

BFI (2008): BFI-level 2

Scopus rating (2008): SJR 1.388 SNIP 1.853

Scopus rating (2007): SJR 1.222 SNIP 2.188

Web of Science (2007): Indexed yes

Scopus rating (2006): SJR 1.208 SNIP 2.268

Scopus rating (2005): SJR 1.109 SNIP 2.103

Web of Science (2005): Indexed yes

Scopus rating (2004): SJR 1.159 SNIP 1.671

Scopus rating (2003): SJR 1.132 SNIP 1.411

Scopus rating (2002): SJR 1.308 SNIP 1.512

Scopus rating (2001): SJR 1.426 SNIP 1.33

Web of Science (2001): Indexed yes

Scopus rating (2000): SJR 1.273 SNIP 1.298

Scopus rating (1999): SJR 0.824 SNIP 1.104

Original language: English

A. Natural fibres, A. Polymer-matrix composites (PMCs), B. Mechanical properties, B. Porosity

DOIs:

[10.1016/j.compositesa.2016.06.003](https://doi.org/10.1016/j.compositesa.2016.06.003)

Publication: Research - peer-review › Journal article – Annual report year: 2016