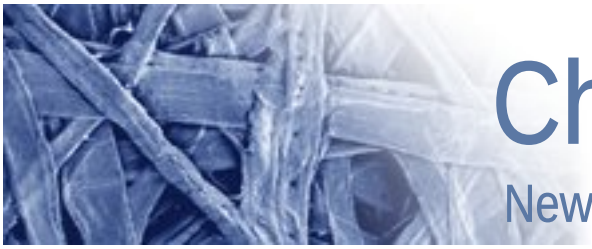


Characterisation Newsletter

Number 04, August 2008

News from PFI:

New projects:

•*Enpap*: "Energy efficient production of wood containing paper for next generation printing presses". Project period: 2008-2012.

•*LoudMem*: "Novel loudspeaker membranes based on nanofibrillar cellulose". The suitability of nanofibrillar cellulose as a component in wood fibre based loudspeaker membranes will be explored. This is a pre-project to be performed during 2008.

New post doc fellow:

•Marco Iotti has started as Post.doc fellow in the project "*Sustainbarrier* – Fiber-based materials: Development of innovative and sustainable barrier concepts". Marco got his PhD in Agricultural Biotechnology at the University of Modena and Reggio Emilia in March 2008. The PhD project focused on the enhancement of performance, in particular barrier properties of packaging materials, by the application of different innovative technologies and the impact on the waste management of biomaterials.

Fibre and paper cross-sectional analysis

Wood fibres have been utilized as an important component of paper products. Presently, wood fibres are processed to manufacture fibres for specific purposes, such as thermo-mechanical, chemo-thermo-mechanical and chemical pulp fibres, and used for e.g. tissue, printing paper and packaging products. The morphology of the pulp fibres may affect the papers optical, mechanical, fluid transport and print properties. In order to achieve a complete understanding of how fibres affect these processes a comprehensive characterization of relevant fibre and paper structures is necessary.

During the last years the suitability of SEM for assessing various characteristics of fibre and paper has been demonstrated. Major efforts have been made to develop and standardize novel microscopy and image analysis methods for structural assessment. A major focus of our research activities at PFI is on the development of new and improved methods for quantification of relevant fibre structure characteristics. We are confident that the use of such tools will give the fundamental know-how needed to improve and perfect pulp quality, thus enabling the creation of novel wood fibre-based products in the years to come.

Upcoming events

PFI-Seminar: "Recent advances in fibrillar nanocellulose research – Characterisation and applications". PFI, Norway, November 12-13, 2008. *Read more...*

Paper surfaces – Characterisation and properties. Arranged by FPIRC and STFI-Packforsk, October 13-16, 2008. *Read more...*

COST E50 workshop: "Characterization and application of cell wall macromolecules". Empa, Switzerland, October 27-29, 2008. *Read more...*

Recommended links

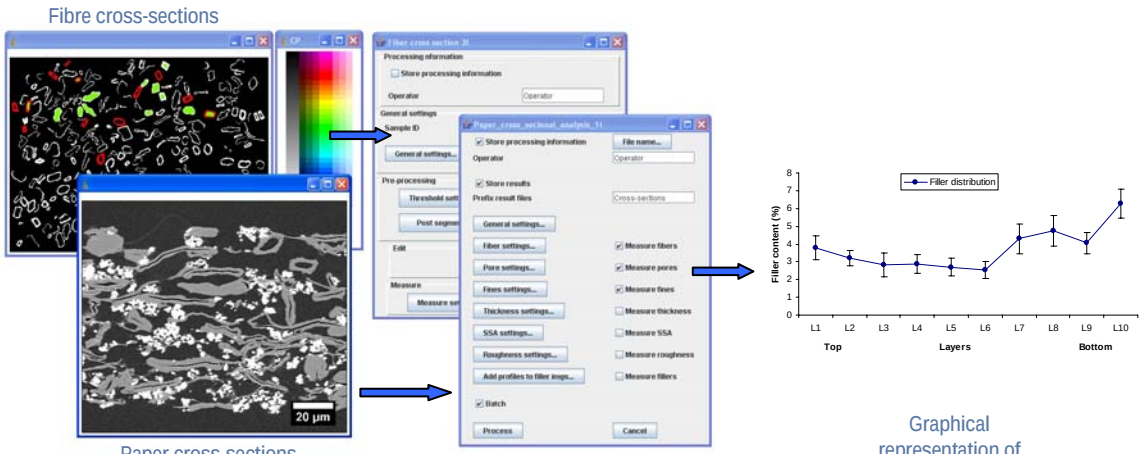
PFI services:
www.pfi.no/contract/contract.htm
STFI-Packforsk:
www.stfi.se

Next issue, January 2009

- Nano-sized cellulose fibrils

Selected analysis method

SEM cross-sectional analysis



Paper cross-sections

Computerised image analysis

Graphical representation of the results

Editor

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Paper and Fibre Research Institute
PFI

Characterisation Newsletter

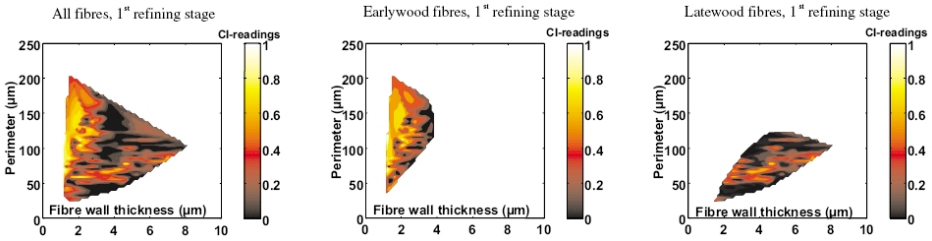
Number 04, August 2008

Fibre cross-sectional analysis

Assessment of Fibre Transverse Dimensions using SEM and Image Analysis

Abstract

New methods, based on SEM images and image analysis, are described for providing cross-sectional fibre dimensions for large fibre populations. The methods are suited for evaluation of changes in the fibre cross-sections during a process. The accuracy of each method is discussed. In order to achieve an accuracy of ±3% in fibre wall thickness, approximately 1000 fibres should be assessed. Examples of use are presented.



The figures show contour plots showing how the Collapse Index varies with different combinations of perimeter and wall thickness for TMP fibres from Norway spruce in three refining stages. A brighter shade corresponds to a larger CI (more flattened), and a darker shade to a less flattened fibre. The contour plots are shown for all fibres in the population (left), earlywood fibres (middle) and latewood fibres (right).

Reproduced from Reme et al. (2002).

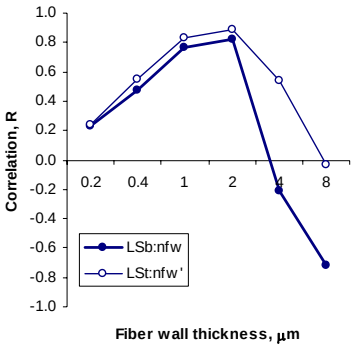
Reference: Reme, P.A., Johnsen, P.O. and Helle, T.: "Assessment of Fibre Transverse Dimensions using SEM and Image Analysis". J. Pulp Paper Sci. 28(4): 122-128 (2002).

Cross-sectional assessment of paper structure

Cross-sectional dimensions of fiber and pore networks based on Euclidean distance maps

Abstract

This study demonstrates the suitability of an Euclidean distance transform (EDT) for assessing the structure of paper. EDT-maps are used for performing a comprehensive assessment of the fiber and pore structure. The suitability of the proposed approach for assessing paper structure is demonstrated with a series of laboratory-made mechanical pulp sheets. Detailed information about the fiber wall thickness, fine material and pore diameters is detailed obtained in an effective way.



The method is compared to previously reported procedures for paper structure assessment based on microscopy. The presented EDT-approach can improve the extraction of relevant information about paper structures. The effects of the fiber and pore dimensions on light scattering are assessed.

The figure shows the successive correlations between the number of fiber wall thicknesses and light scattering, as a function of the fiber wall thicknesses.

Reproduced from Chinga et al. (2007)

Reference: Chinga, G., Solheim, O. and Mörseburg, K.: "Cross-sectional dimensions of fiber and pore networks based on Euclidean distance maps". Nordic Pulp Paper Res. J. 22(4): 500-507 (2007).

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