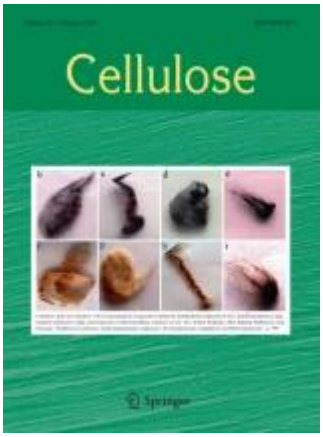
Optical 3D crepe reconstruction for industrial base tissue paper characterization



Joana C. Vieira, António de O. Mendes, Ana M. Carta, Paulo T. Fiadeiro & Ana P. Costa

Cellulose - Volume 29, pages 9919–9934
DOI: 10.1007/s10570-022-04833-x
Publication Date (Web): September 12, 2022

Abstract

The softness is an important property of tissue papers products and can be a differentiating factor in terms of consumers preference. So, the manufactures have a concern of optimizing this property starting in their industrial base tissue papers. In this work, a dedicated optical system was used for the surface topography reconstruction to characterize the crepe of 13 different industrial base tissue papers, and to study the relationships with their structural properties. In this context, the main objective was the analysis of the 3D reconstruction surface maps of the samples and the corresponding Fourier transformations for the crepe characterization considering the dominant spatial frequencies, depth, and wavelengths of the crepe folds per length unit. A thorough and detailed study was carried out using only the 4 samples that were found to be the extreme cases in terms of handfeel (HF), the worst two and the best two. These calculations, together with the 3D maps obtained with the optical system, the global and magnified images of their surfaces, and the images of their fibrous suspensions, allowed to infer and discriminate the differences that exist between them, which are important for the evaluation and optimization of the global tissue paper quality in line with the conventional methods.