



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Crack Propagations and Fatigue Characteristics of Some Handmade Papers*

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Abstract: In this work, a number of handsheets made from unbeaten and unbleached kraft, refiner mechanical and cotton linter pulps and crack propagations on paper samples under monotonic loading, were analyzed and possible links with the properties of fibrous networks were investigated. Crack initiation and propagation on the tested paper strips were also investigated under a scanning electron microscope to determine visually the state of the paper matrix under applied loads. Furthermore, paper samples were subjected to a series of mechanical tests, such as tearing resistance, folding endurance and tensile strength. The primary goal of this study concentrated on determining the fatigue life responses of paper samples under cyclic loading. An empirical equation for the fatigue life responses of paper samples tested was developed. It was found that paper, being a heterogeneous composite material, responds differently to applied loads depending on the properties of its constituent individual fibers and the nature of interfiber bonding in its structure. Kraft handsheets, for instance, showed the highest mechanical properties, followed by samples made from refiner mechanical pulps and cotton linters respectively. Overall, the equation developed proved to be a good way of predicting the fatigue life of paper materials subjected to variable loads.

Key Words: Fibrous network, interfiber bonding, crack propagation, fatigue life

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