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Slope of grain ultrasonic measurements in living trees and timber

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Subject: Anwendung von Ultraschall in Längsrichtung zur Bestimmung des Faserverlaufswinkels im lebenden Baum und im Schnittholz.

Material and method: The propagation phenomena of ultrasonic waves in wood are governed by Christoffel's equations. The slope of grain measurement is deduced from the corresponding propagation law in LT or LR symmetry planes (L,R,T are the principal symmetry directions). Ultrasonic velocities were measured using the equipment with the following main characteristics for the pulser-receiver section: maximum pulser voltage 250 V; band width 3–300 kHz; band filter on receiver 80 kHz; sensitivity 1–1000 $mV \cdot cm^{-1}$; time base 30–10000 µs; repetition rate 20 Hz. The measurements were performed on living trees (Populus spec.) and airdried timbers [Picea abies (L) Karst.], using an emitter and three receivers grouped around the emitter in a circle of chosen radius. The ultrasonically predicted angle was compared with the optically determined angle in the specimen tested. The accuracy of measurement was: 0.1 µs for the time of propagation, 1% for the velocity measurement, 0.1 degree for the grain angle versus the axis of the board or 0.5 degrees versus the generating line on the living tree periphery. Experimental results are given as follows:

Species and specimens	Wood m.c.	Angle	
		Optical method	Ultrasonic method
Poplar trees	70%	2°	1.25
Spruce timber	12%	5°	4°

Results: 1. The proposed ultrasonic method allows the measurement of grain angle in both green and dry wood at variable distances. As minimum distance 20 cm are suggested and no limitation for the maximum distance. **2.** Beyond present limitation the proposed experimental technique could be extended to the useful field of materials characterization and defect detection in structural members. Criteria need to be established for defect detection and location. The multi-parameter techniques as mode conversion technique can provide a convenient means for the inspection of large areas using relatively simple specimens.

Bucur, V. 1987: Wood characterization through ultrasonic waves. In: Alippi, A.; Mayer, W.G. (Eds.): Ultrasonic methods in evaluation of inhomogeneous materials. p. 323–343; Dordrecht: M. Nijhoff Publ.

Determination of the formaldehyde release of medium density fibreboards using the WKI-method

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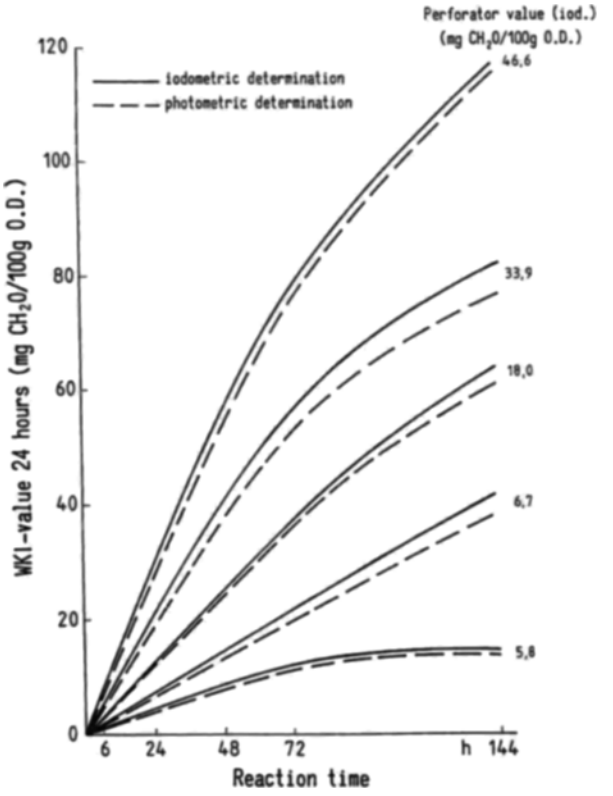
Subject: Bestimmung der Formaldehydabgabe von mitteldichten Faserplatten nach der WKI-Flaschenmethode.

Material and Method: The formaldehyde release of 5 different medium density fibreboards covering a wide range of emission was determined using the WKI-method (Roffael 1975) for different reaction periods. By plotting the amount of formaldehyde liberated versus the reaction time, curves are obtained representing the rate of formaldehyde emission. The formaldehyde emitted was determined both iodometrically and photometrically. The perforator values of the different boards were also determined using both iodometric titration and photometric estimation (with acetyl acetone as a reagent).



Results: 1. Differences between different fibreboards become more evident by increasing the reaction time in the WKI-method. **2.** The photometrically determined WKI values are lower than those determined iodometrically; however, the differences are very low and do not exceed 2 mg/100 g board. **3.** Using the WKI-method fibreboards with only subtle differences in their perforator value can be easily differentiated, especially after long reaction times.

Roffael, E. 1975: Holz. Zbl 101:1403–1404