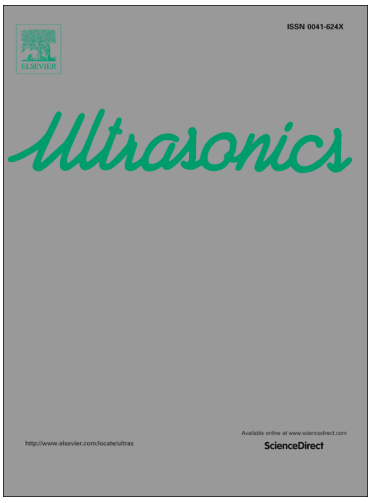

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The study of wood knots using acoustic nondestructive testing methods

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Abstract

In the process of wood grading with the focus on detecting wood knots, nondestructive testing methods based on sound transmission can assist the traditional characterization methods to achieve a higher efficiency and better results. In this paper, we use two independent methods based on resonance and sound speed measurements to evaluate the elastic modulus of wood beams containing different knots. The results show that the method based on sound speed measurements offers a fast procedure to evaluate whether the knot is in the middle of the cross-section of the beam or not. In this case, both measuring methods are reliable in determining the knot's characteristics. In the off-center case, the resonance method performs better to quantify the size of the knots.

Keywords: Acoustic nondestructive testing; Resonance; Sound speed; Wood knot

1 Introduction

Acoustic nondestructive testing methods applied to wood primarily use the change of sound speed and sound resistance to obtain information about the mechanical characteristics of the wood under consideration and of the location of potential internal defects. Basically one can distinguish three kinds of methods: the ultrasonic pulse method, the acoustic emission technique and the resonance method.

In the early 80's, Dunlop adopted the ultrasound pulse method to detect defects

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