

## **The Investigation of Acoustic Properties of Carbon Fiber-Polyester Composites and Comparing the Results with Poplar, Walnut and Beech Wood Specimens**

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### **Abstract:**

In this paper, regarding the high capability of polymeric composites as a substitute of the wood in musical instruments, the acoustic properties of carbon fiber-polyester composites, such as elastic modulus, acoustic coefficient, acoustic coefficient efficiency etc, were investigated using free longitudinal and flexural vibration non-destructive tests and forced vibration non-destructive test. For better understanding, three wooden samples of poplar, walnut and beech trees (frequently used in the manufacturing of musical instruments) were chosen and analyzed. Comparing the results showed that the resultant composites had essential acoustic and vibrational properties higher than those of wood samples. Ultrasonic velocity and elastic modulus in longitudinal direction of carbon composites were approximately 11300 m/s and 130GPa, respectively. Besides, the damping results of carbon composites are magnificent and far better than those of the wood specimens.

**Key words:** Carbon fiber; Polyester resin; Elastic modulus; Acoustic coefficient; Poplar wood; Walnut wood; Beech wood.

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