Características mecánicas y acústicas de cuatro especies de madera sometidas a cargas de flexión [

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text (article)

Analítica

The mechanical and acoustic properties of four commonly used wood species, including Populus tomentosa (Poplar), Swietenia mahagoni (Mahogany), Fagus orientalis (Beech), and Fraxinus excelsior (Ash) wood were investigated through using three-point bending and notched bending tests synchronizing with power spectrum analysis method and fractal dimension theory. The results showed that the bending modulus of elasticity and modulus of rapture changed in the same trend with the order ranging from high to low was ash, beech, poplar, and mahogany, successively. The brittle fracture occurred in mahogany samples and duc-tile fracture raised in the other three wood species. Positive proportional correlation was observed between maximum acoustic pressure and fractal dimension of power spectrum regardless of seeing four wood species as independent or population samples. The failure modes can be identified by amplitude-frequency curve and fractal dimension of power spectrum with following laws: the peak value in amplitude-frequency curve and fractal dimension of power spectrum were relatively higher when a single crack developed at latewood; for crack developed at earlywood, only one peak was observed in power amplitude-frequency curves, and the corresponding fractal dimension of power spectrum was smaller than the that of latewood; in case of failure modes with two cracks developed at earlywood, there are two peaks in amplitude-frequency curve and the frac-tal dimension of power spectrum was between those of single crack developed at earlywood and latewood. The vibrational properties of the four wood species can be characterized through using power spectrum analysis method and notched bending test method can be used to distinguish the failure modes of samples
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Baratz Innovación Documental

- Gran Vía, 59 28013 Madrid
- (+34) 91 456 03 60
- informa@baratz.es