Improvement of the CT Reconstruction Technique Using Portable Soft X-ray Apparatus

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Structural members of Korean traditional building were usually made by wood. And the style of that is post-beam architecture which is exposed to exterior environment. So it is very important to detect decay and deterioration of wood because wood play an important role in structural stability. Non-destructive evaluation is an effective method to evaluate internal state of wood. Among the methods, X-ray technique is an effective way to evaluate wood which has a large diameter. Moreover, CT (Computed Tomography) reconstruction technique using X-ray is very useful to display an internal state of wood. But it is not easy to apply at the site. First, X-ray could be harm to users or researchers when they use X-ray at the site. Secondly, medical machines of X-ray CT cannot be used in field. Lastly, medical machines are not economical.

Our studies had been done to develop CT reconstruction technique to show internal state of wooden members by using a lesser number of soft X-ray radiographs. Add to former research results, this study has an object to improve accuracy of the CT image through analysis of soft X-ray radiographs. Add to former research results, this study has an object to improve accuracy of the CT image through analysis of soft X-ray radiographs. Add to former research results, this study has an object to improve accuracy of the CT image through analysis of soft X-ray radiographs. Add to former research results, this study has an object to improve accuracy of the CT image through analysis of soft X-ray radiographs. Add to former research results, this study has an object to improve accuracy of the CT image through analysis of soft X-ray radiographs.

To improve accuracy of the CT image, a single radiograph was investigated. It could be confirmed that actual centre of X-ray radiation was different to physical centre between X-ray tube and detector. And the density of specimen was more overestimated as a part of specimen apart from centre of detector. In addition to these, the diameter of specimen or the length of deterioration was also overestimated. These problems could come from using commercial X-ray apparatus which was made for not CT image but X-ray examination and disregarding the shape of X-ray radiation. Therefore, a single radiograph was analyzed to find actual centre of X-ray radiation by a contour line of intensity of radiation using MATLAB program. And CT image was restructured after considering shape and intensity of X-ray radiation according to distance of centre of detector. If the intensity of actual centre of X-ray radiation was I, the intensity of X-ray radiation will be (a^2/(a^2+b^2))×I. Where, a is the shortest distance from centre of X-ray radiation to detector and b is a circle radius around point a in detector. It could be found that accuracy of CT image was improved when the pixel of CT image had been analysed.

So, it will be applied to evaluate decay of deterioration of historical wooden structure member or standing tree in the site through development of device after from this study.

Keywords: Non-destructive Evaluation; X-ray; CT Reconstruction; Internal State of Wood

Validation of a X-Ray densitometry method for the determination of Eucalyptus grandis and Eucalyptus urophylla radial density profile

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The X-ray densitometry is considered one of the main non-destructive techniques for the analysis of wood due to the high precision and practicality. The method has been applied in determining the density of the wood, and the density variation is a result of the anatomical structure and chemical composition of the same. This technique is still used in identification of growth rings and determine the pattern of radial variation of density.

This work aimed to ascertain the reliability of the information obtained by the x-ray densitometry technique in determining radial density profile on clones from Eucalyptus sp. To this, it was used two and three clones of Eucalyptus grandis and of Eucalyptus urophylla, respectively, with 53 months of age. For radial profile of density determination, withdrew a sample, from each individual, was withdrawn perpendicularly to the axis, passing through the medulla at 1.30 m above the ground. The remainder of the radial sample was sectioned into small specimens with two millimeters of thickness, approximately, for determination of density by hydrostatic method.

Analysis of the data obtained showed that the pattern of radial variation of density obtained by the technique in challenge is very similar to the standard achieved by the determination of density by hydrostatic method, inferring so that the technique is reliable for this kind of analysis.

Keywords: Variation, clones, density.

The Usage of Gamma Ray Attenuation Method for Eucalyptus Wood Density Evaluation at Past Ages

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The main objectives of the development of clonal eucalyptus forests are rapid growth and productivity. Considering the great diversity of species, the genus Eucalyptus has the potential to attend different segments of wood industry. One of the principal parameters for wood quality evaluation is the basic density, especially when considering industrial and energy purposes. This property has relatively simple determination and is well correlate to several other wood properties.

The objective of this study was to determine basic density of wood on the ages of 2, 4 and 6 years of the physiological development of Eucalyptus spp. 6 years old trees using densitometric radial profiles obtained using the method of gamma ray attenuation and, addi-
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