PENGUJIAN NON DESTRUKTIF GELOMBANG ULTRASONIK PADA BALOK TIGA JENIS KAYU TANAMAN INDONESIA

(*Non Destructive Testing of Three Indonesian Plantations Wood Beam*)

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ABSTRACT

Ultrasonic-based methods of non destructive testing applied to wood have been intensively developed during the last decade. There are two parameters used to evaluate of wood based on ultrasonic method, ultrasonic velocity and atenuation. The main objective of this research was to analyze ultrasonic velocity characteristics of wood beam. Three wood species were used in this research representing high, medium, and low density. The beam specimen of (8 x 12 x 200) cm from tectona (Tectona grandis), manii wood (Maesopsis eminii), and sengon (Paraserianthes falcataria) were prepared in air dried condition. The ultrasonic wave propagation was measured by SylvatestDuo®. The dynamic stiffness (MOEd) was gained based on Christoffel equation formulating correlation between the ultrasonic velocities and density. The results showed that ultrasonic velocity propagation decreased by increasing wood density between species. On the other hand, in same species higher wood density caused increase in ultrasonic velocity propagation. Statistical analysis showed that no significant influence of vertical position of beam in tree (bottom, middle, and top) on Vus and MOEd. However, there was significant effect from measurement direction of wave propagation (longitudinal, radial, and tangential). Length dimensions were influenced by ultrasonic velocity values in which those values decreased by increasing length dimension.

Keyword: *ultrasonic velocity, MOEd, beam, vertical position, and symmetry axes*

PENDAHULUAN

Evaluasi non destruktif (*non destructive evaluation/testing, NDE/T*) didefinisikan sebagai metode mengidentifikasi sifat fisis dan mekanis bahan tanpa menimbulkan kerusakan yang berarti yang dapat mengubah kemampuan pemanfaatan akhir dari bahan tersebut (Ross, 1992). Metode pengujian non destruktif kayu berbeda dengan pengujian terhadap bahan homogen yang isotropis seperti metal, glass, plastik dan keramik. Pada bahan tersebut pengujian non destruktif digunakan untuk menilai cacat yang muncul akibat dari diskontinuitas, adanya rongga (*voids*) serta kemungkinan adanya pembesaran (*inclusions*) selama proses pembuatan yang dapat berpengaruh terhadap sifat fisis dan mekanis produknya. Pada kayu yang merupakan bahan biologis yang tersusun secara heterogen, pengujian non destruktif digunakan untuk mengetahui ketidakteraturan yang muncul akibat faktor alami atau dipengaruhi lingkungan yang dapat mempengaruhi sifat fisis dan mekanis kayu (Ross, 1992).

Terdapat beberapa tipe pengujian non destruktif kayu yang dikembangkan antara lain: teknik mekanis, vibrasi, akustik/