

DETERMINATION OF STIFFNESS AND DAMPING COEFFICIENT OF TRACTOR FRONT TYRES IN NON-ROLLING CONDITIONS

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ABSTRACT

The suspension characteristics of agricultural tractors are dictated mainly by the characteristics of the tyres as they do not have spring suspension system like those provided on road vehicles. The tyre can be modeled approximately as a spring-damper system exhibiting under damped vibration.

The apparent spring stiffness and damping coefficient of a tractor front tyre was estimated in a non-rolling condition in the laboratory. For this purpose a test rig was fabricated. It had provision to measure the force transmitted by the wheel to a horizontal platform and to measure the deflection of axle. The wheel was dropped from a height of 50mm during the test. The force and deflection were recorded continuously using a data acquisition system at the rate of 33 sample readings per second per channel. The apparent spring stiffness and damping coefficient were estimated from the graph of displacement Vs time. The minimum and maximum values for stiffness are 156.73 kN/m and 174.196 kN/m respectively. The average value was obtained as 165.771 kN/m. And the minimum and maximum values for damping coefficient are 0.3752 kN.s/m and 0.5842 kN.s/m. The average value obtained as 0.46 kN.s/m.

KEYWORDS: Under Damped Vibration, Spring Constant, Damping Coefficient, Pneumatic Tyre and Drop test

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