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## An experimental and analytical study of the tractor ride comfort

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**Abstract:** This paper is concerned with an investigation into the dynamic ride behaviour of a Nasr tractor (type 651) in three degrees of freedom. The tractor itself is treated as a rigid body undergoing vertical, pitch and roll motions. The influence of wheel stiffness is studied with a view to improving ride comfort. A mathematical model for an off-road vehicle (tractor) is developed, and the results it predicts are compared with experimental measurements. The experimental and theoretical results obtained indicate that the mathematical model produces optimistic results for the vertical, pitch and roll directions. The effect of wheel stiffness and damping coefficient to improve the tractor ride response are discussed.

**Keywords:** pitch motion, roll motion, tractor ride comfort, wheel damping, wheel stiffness.

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### Nomenclature

$B$	wheel track,
$C_{fv}$	damping coefficient of front wheel in vertical direction,
$C_{rv}$	damping coefficient of rear wheel in vertical direction,
$H_g$	height of c.g. above the ground,
$I_p$	moment of inertia of tractor in pitch direction,
$I_r$	moment of inertia of tractor in roll direction,
$K_{fv}$	stiffness of front wheel in vertical direction,
$K_{rv}$	stiffness of rear wheel in vertical direction,
$L$	tractor wheelbase,
$L1$	horizontal distance between front wheels and c.g.,
$L2$	horizontal distance between rear wheels and c.g.,