

# AN INVESTIGATION INTO THE INTERACTION BETWEEN VEHICLE RIDE AND TILT SYSTEMS

Operating experience has shown that the tilt system can significantly influence the character of the ride of a tilting vehicle on straight track. In an attempt to understand and predict this behaviour, an existing linear suspension modelling technique has been applied to model a pair of vehicles with a precedence tilt system on the second vehicle. This report describes the process and predictions, and compares them with measurements from laboratory and track testing.

This work has shown that tilt systems can modify the plain track ride of railway vehicles, particularly in the roll sense. It is therefore essential that the suspension design and tilt system design should not be considered in isolation, and any compromise between transition response and straight track ride should be made on as scientific a basis as possible.

The quantitative agreement between the theoretical modelling and measured results for the non-tilting vehicle is disappointing, although this finding is in accord with previous reports. Given these limitations, the modelling of the effects of the tilt system appears to be largely correct. The theoretical model is thus valuable in allowing an improved understanding, and will allow the designer to study the effect of alternative control strategies on both transition response and straight track ride. Although the model will not accurately predict actual behaviour, it should still be capable of assessing the relative merits of different tilt configurations. This will be of great benefit in selecting an optimum tilt system.

It is hoped to carry out further work, possibly using non-linear techniques, to improve the prediction of kinematic mode behaviour. This would allow the methods to be used with greater confidence in future.