

# Handling analysis of a two-wheeled vehicle using MSC.ADAMS/motorcycle

R. CAPITANI, G. MASI, A. MENEGHIN\* and D. ROSTI

Dipartimento di Meccanica e Tecnologie Industriali, Università di Firenze, Italy

In this article, the results of a virtual analysis of a two-wheeled vehicle are described. A virtual prototype of a Piaggio Liberty 150 4T was built to evaluate the handling behavior during some codified maneuvers. The activity was done with the cooperation of Piaggio & C. SpA and MSC Software.

The multibody model was built using MSC.Adams/Motorcycle. It reproduces the original vehicle (geometry, inertia, and spring/damper coefficients) and is fully parametrized. The actions between ground and tires are calculated with the 'Magic Formula'. The multibody model, controlled applying a steering torque to the handlebar, was tested during some maneuvers (turn, ISO lane change, 'Figure 8'), and the results were compared with the experimental data acquired with an instrumented vehicle during the same maneuvers.

Signal comparison gave a good agreement except for the differences due to the input forces: the multibody model is controlled only with the steering torque, but body movements and feet and hand pressures are applied to the instrumented vehicle.

*Keywords:* Motorcycle handling; Virtual prototyping; Experimental analysis

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