

A METHODOLOGY FOR INCLUDING SUSPENSION DYNAMICS IN A SIMPLE CONTEXT OF RAIL VEHICLE SIMULATIONS

IVANO LA PAGLIA¹, LUCA RAPINO^{2*}, FRANCESCO RIPAMONTI³ AND
ROBERTO CORRADI⁴

¹ Politecnico di Milano,
via La Masa 1, Milano, 20156, Italy
ivano.lapaglia@polimi.it

² Politecnico di Milano,
via La Masa 1, Milano, 20156, Italy
luca.rapino@polimi.it

³ Politecnico di Milano,
via La Masa 1, Milano, 20156, Italy
francesco.ripamonti@polimi.it

⁴ Politecnico di Milano,
via La Masa 1, Milano, 20156, Italy
roberto.corradi@polimi.it

Key Words: secondary suspensions, dynamic stiffness, flexible carbody, rail vehicle dynamics.

Abstract. *The running behaviour of rail vehicles is highly influenced by suspension components. Dealing with ride comfort, secondary suspensions are adopted to reduce the vibrations transmitted to the carbody. In this context, the dynamics of the suspension elements themselves has to be properly included in multibody system. This paper proposes a strategy for modelling the passive vertical secondary suspension in the frequency domain. To this aim, a mathematical model is defined and its parameters are tuned to be representative of a real system. Then, a sensitivity analysis over the model parameters is proposed to discuss the suspension performances in terms of dynamic stiffness. Finally, a finite element model of the carbody is considered and coupled to the rear and front suspensions. The model is adopted to simulate the vehicle running on a rail track irregularity in the frequency domain, in the 0-30 Hz frequency range.*