

## **Longitudinal dynamics of freight trains**

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A comprehensive parametric study is performed on the longitudinal dynamics of a freight train based on different nonlinear time-domain models. The effect of different parameters, such as the couplers stiffness and damping, train speed, train acceleration, load distribution pattern, on the longitudinal train dynamics are investigated. Moreover, the effect of an empty wagon and its position, on the overall longitudinal train dynamics is discussed. A computer simulation model is developed to determine the optimum placement of the second locomotive in order to obtain the lowest longitudinal forces. Further study is carried out to determine the best type of automatic couplers.