

Stability of snaking trailers

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Abstract: The mechanical model of a two-wheeled trailer is constructed to describe the spatial motion and the roll-over of the trailer. The governing equations are derived with special attention to the non-smoothness and non-linearities that strongly affect the dynamics of the trailer. The presence of unstable limit cycles related to these properties makes the vibrations of the trailers intricate from practical point of view. Bistable parameter domains may be observed where large amplitude oscillations and the stable rectilinear motion coexist. The aim of the study is to investigate the effects of the parameters (such as payload position, the stiffness and damping of the suspension and speed) on the linear stability and on the non-linear vibrations. The analysis is based both on analytical and numerical techniques.

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