2009 Proceedings of the 21th International Symposium: Dynamics of Vehicles on Roads and Tracks

# The Use of Inerters Improves the Stability and Performance of a Full-Train Model

Fu-Cheng Wang and Min-Ruei Hsieh

**Abstract**

We investigated the lateral stability of a full-train suspension system by using *inerters*. Herein, inerters are proposed as an ideal mechanical two-port element to substitute for the mass element in the mechanical/electrical analogy. In the previous study, we used a 16 degrees-of-freedom (DOF) half-train model to demonstrate the potential improvement on critical speed brought about by the use of inerters. In this paper, we apply the ideas presented in the previous work to a 28 DOF full-train model and discuss the benefits related to stability and system performance. The results show the effectiveness of inerters with regard to improving the lateral stability and dynamic responses of train systems.