

Stability and Performance Analysis of a Full Train Model with Inerters

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Abstract

This paper discusses stability and performance of a full-train system employing inerters. First, a twenty-eight degree-of-freedom (DOF) train model was built on AutoSimTM and linearized for analysis in MatlabTM. We then optimized the critical speed of the system and showed that the critical speed can be significantly improved by employing inerters. Third, we discussed the system's transient responses and illustrated that the settling time can be greatly shortened by using inerters. Lastly, a novel mechatronic inverter was considered for further improvement of the train system.