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Development of Maglev Guideway Loading Model

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Abstract

Magnetic levitation (maglev) has already captured the demanding eyes of worldwide transportation networks. However, there is hardly any report of practical algorithms for systematic calculations of loading on guideways of magnetically levitated trains. A proper model for guideway load distribution and accuracy of such model is the backbone for optimized guideway design. This research is in response to such a necessity. Parameters that are effective for the analysis and design of guideways, including its loading patterns and structural models, are investigated. Vehicle mechanical design and its loading capacity in addition to guideway geometry and properties of magnetic force elements are also used to develop the loading models. Correlation between magnetic forces and dynamics of the vehicle regarding its ride comfort on the straight and the curved routes are implemented. This facilitates evaluation of guideway structure in view of its mechanical strength and dynamic stability. The proposed models are evaluated in a case study by reviewing route design for the Mashhad-Tehran maglev system. It is concluded that the proposed analytical methods are accurate and ready made for practical purposes. © 2011 American Society of Civil Engineers.

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