

The Influence of Contact Models on Discrete Element Modeling of the Ballast Layer Subjected to Cyclic Loading

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Abstract : Recently, there has been growing interest in numerical modeling of ballast railway tracks. A commonly used mechanistic modeling approach for ballast is the discrete element method (DEM). Up to now, the effects of the contact model on ballast particle behavior have not been precisely examined. In this regard, selecting the appropriate contact model is mainly associated with the particle characteristics and the loading condition. Since ballast is cohesionless material, different contact models, including the linear spring, Hertz-Mindlin, and Hysteretic models, could be used to calculate particle-particle or wall-particle contact forces. Moreover, the simulation of a dynamic test is vital to investigate the effect of damping parameters on the ballast deformation. In this study, ballast box tests were simulated by DEM to examine the influence of different contact models on the mechanical behavior of the ballast layer under cyclic loading. This paper shows how the contact model can affect the deformation and damping of a ballast layer subjected to cyclic loading in a ballast box.

Keywords : ballast, contact model, cyclic loading, DEM

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