Dynamical Contact Simulation of Pantograph-Catenary Coupled System Based on Time Integration Method

Ning Zhou[1] and Weihua Zhang[1]

Summary

In this paper, the dynamic contact behavior of the stitched catenary and the pantograph is simulated. The model of the catenary including support wire, dropper, contact wire and assistant wire is established with the finite element method (FEM), and the pantograph is also simplified as a multi-body system with mass, stiffness and damping. Furthermore, based on the contact element, the coupled motion equation of the pantograph-catenary system is derived. With the time integration method, the coupled motion equation is solved and the lifted displacement, contact force and dynamic stress are obtained. At last, the influence of the running velocity on the performance parameter is discussed. Depending on previous results, the calculation method based on the contact element and time integration can be directly used for the dynamic behavior analysis of the pantograph-catenary coupled system.

keywords: Catenary; Pantograph; Contact Element; Time integration Method

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[1]State Key Laboratory of Traction Power, Southwest Jiaotong University, Chengdu 610031, Sichuan, PR China