Fundamental Study on Contact Force Estimation Method of Pantograph/Catenary Systems using Kalman Filter

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The contact force between overhead wires and pantographs is an important indicator for evaluating the current collection performance. This study proposes to use a Kalman filter as a model-based approach to estimate the contact force. In this paper, an external force identification method based on an augmented state-space equation is applied to solve the dynamics of pantographs. First, the validity of the proposed method is verified through by simulations based on a 2-degree-of-freedom model, in order to clarify the effect of measurement error, modeling error and variance of the contact force on the contact force estimation. A finite element model of the pantograph is then used to investigate the effect of modeling errors on the accuracy of contact force estimation.