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An Approximate Conflict Detection and Resolution Model for Moving-Block Signalling by Enhancing RECIFE-MILP

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Conflict detection and resolution models are being developed to support railway traffic management in taking optimised rescheduling decisions in case of disturbances. Existing models mostly concern fixed-block signalling systems, in which minimum train separation distances are determined based on a preset number of blocks representing worst-case braking distances. In a moving-block signalling system, minimum train separation is based on absolute braking distances and hence depends on train speed differently from how fixed-block conflict detection and resolution models. In this paper, we propose a conflict detection and resolution model that approximates moving-block operations. The model enhances the state-of-the-art fixed-block rescheduling model RECIFE-MILP. The enhancements include a reconsideration of the discretisation of the infrastructure, the introduction of a speed profile alternative and a redefinition of the blocking times. We verify the model by comparing the solutions of the moving-block version with the fixed-block version for a specific scenario. The results indicate that the moving-block model can propose different rescheduling decisions than the fixed-block model with a better delay recovery.

Keywords
Railway traffic management, Conflict detection and resolution, Rescheduling, Moving-block signalling, Mixed integer linear programming