

THE FORMULATION AND TESTING OF A TRAIN REGULATION STRATEGY TO MINIMISE A WEIGHTED COST FUNCTION

Up to the present time, train regulation strategies have been developed to minimise an unweighted cost function, the aggregate final delay to all trains. However most railway operators would agree that, as a general rule, higher classes of train should be given some degree of priority. Hence a weighted cost function should be calculated, and it is necessary to develop train regulation strategies which take the weighting factors into consideration.

The report defines simple decision rules which form the basis of such a regulation strategy (strategy 2).

Strictly, the sequencing of a pair of trains over a route intersection to minimise weighted delay depends upon the characteristics of the trains (eg tractive effort) and the physical layout (eg signal positions) as well as the weighting factors. However, it has been shown that it is possible to approximate to the optimal sequencing by using just weighting factors and time estimates derived from the working timetable. The simple decision rules have therefore been modified to produce enhanced decision rules (strategy 3).

Comparing the effectiveness of strategies 2 and 3 and a strategy independent of weighting factors (strategy 1) by simulation, it may be concluded that:

- All three strategies give similar regulation with a few decisions being made differently.
- Strategy 3 is better than strategy 2.
- Even with all weighting factors equal, strategy 3 is better than strategy 1.

Strategy 3 or a similar weighted strategy should be used in a real-time train regulation system where it is required to minimise a weighted cost function, particularly if there is a considerable mix of train classes running through the area.

Further work is recommended to establish whether the optimal regulation for weighted cost functions can be established, and if so to compare it with strategy 3. The effectiveness of strategy 3 for varying traffic density in a chosen area should be investigated further.