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A METHODOLOGY FOR VISUAL INSPECTION CYCLE OPTIMIZATION: REFINEMENT OF STATISTICAL DETERIORATION PREDICTION THROUGH CROSS-DISCIPLINARY INSPECTION RECORD INTEGRATION

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Summary: In Japan's local railways, maintenance-saving strategies have become an increasingly important issue due to the declining number of both railway users and maintenance personnel. This study focuses on rail bonds, which require frequent visual inspections, and aims to support the development of rational maintenance plans. The exponential hazard model was employed to model the occurrence of rail bond anomalies and predict deterioration based on inspection records. Although rail bonds are managed by the electrical division, this study incorporates track inspection data from the track maintenance division to enhance the accuracy of deterioration prediction. Track characteristics linked to rail bond installation sites, such as curvature, various track geometries and so on, were included as characteristic variables in the model. As a result, the deterioration characteristics of each rail bond could be quantitatively assessed. Furthermore, the probability of anomalies (maintenance limit) tolerated under the current inspection cycle was calculated, and the feasibility of extending the inspection interval without exceeding the maintenance limit was calculated. The results suggest that the current 90 days inspection cycle could be extended to 120 days in most places except for a few sections.