

## Nonlinear Estimation Model for Rail Track Deterioration

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**Abstract :** Rail transport authorities around the world have been facing a significant challenge when predicting rail infrastructure maintenance work for a long period of time. Generally, maintenance monitoring and prediction is conducted manually. With the restrictions in economy, the rail transport authorities are in pursuit of improved modern methods, which can provide precise prediction of rail maintenance time and location. The expectation from such a method is to develop models to minimize the human error that is strongly related to manual prediction. Such models will help them in understanding how the track degradation occurs overtime under the change in different conditions (e.g. rail load, rail type, rail profile). They need a well-structured technique to identify the precise time that rail tracks fail in order to minimize the maintenance cost/time and secure the vehicles. The rail track characteristics that have been collected over the years will be used in developing rail track degradation prediction models. Since these data have been collected in large volumes and the data collection is done both electronically and manually, it is possible to have some errors. Sometimes these errors make it impossible to use them in prediction model development. This is one of the major drawbacks in rail track degradation prediction. An accurate model can play a key role in the estimation of the long-term behavior of rail tracks. Accurate models increase the track safety and decrease the cost of maintenance in long term. In this research, a short review of rail track degradation prediction models has been discussed before estimating rail track degradation for the curve sections of Melbourne tram track system using Adaptive Network-based Fuzzy Inference System (ANFIS) model.

**Keywords :** ANFIS, MGT, prediction modeling, rail track degradation

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