SYNOPSIS

Thesis Title : REMAINING FATIGUE LIFE OF STEEL RAILWAY BRIDGES UNDER ENHANCED AXLE LOADS

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In this study, various fatigue damage models proposed by researchers have been discussed. A detailed discussion is presented on the experimental studies conducted to obtain the strain responses of a steel railway bridges under increased axle loading. Extensive instrumentation was carried out to get the responses of the instrumented girder during the passage of the trains running at different speeds. Further, a test train formation was used to get the structural response from the bridge where the test formation represented the proposed increased axle load in iron ore route of Indian Railways. Also, responses at the critical sections of the bridges have been captured during passage of the scheduled passenger train and goods train.

In the numerical study, same bridge was modeled using ANSYS. Transient dynamics analysis technique was used to determine the dynamics response of structure under the action of any general time dependent load. The analysis was carried out for normal speed as well as for increased speed of the trains. The response obtained from the experimental works as well as from numerical investigation were used to calculate the damage index based on different damage models of the bridge was evaluated. Nevertheless, it is significant to mention that there are some deficiencies in the reported fatigue damage models. Most of them are not able to take account of load interaction effect, load sequences and load level. So, to take care of these issues in the fatigue damage models, there is a need to develop a unified fatigue damage model which will be also valid for low stress cycle problems.