

## **Performance evaluation of genetic algorithm tuned PID and limited state feedback with sensitivity analysis controllers for railway vehicle suspension**

### **Abstract**

This paper introduces mathematical models of three degree-of-freedom (3-DOF) half car model of railway vehicle suspension. The governing equations of railway vehicle model are developed based on Second Newton's Law. The development of controller techniques applied to reduce unwanted body response of railway vehicle is presented. The controllers used in this study are PID and limited state feedback (LSF) controller. Genetic algorithm is used to optimize the PID controller by minimizing the mean square error of the railway vehicle body acceleration, and sensitivity analysis (SA) method is used to find an optimal value of LSF controller. The results show that the proposed control schemes are able to improve the vehicle body response effectively.

**Keywords;** Genetic algorithm; Limited state feedback; PID controller; Railway vehicle suspension; Sensitivity analysis