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Speed dependent optimisation for variable stiffness vehicle suspension

Xin Tang[1], Weihua Li[1*], Haiping Du[2]

[1] School of Mechanical, Material and Mechatronics Engineering, University of Wollongong, NSW, Australia, xt955@uowmail.edu.au;
[2] School of Electrical, Computer and Telecommunications Engineering, University of Wollongong, NSW, Australia, *Email: Weihuali@uow.edu.au;

Abstract

In this research, an optimization of vehicle suspension performance under different vehicle speeds is studied. Besides finding optimal damping value to achieve a better suspension performance, changing the value of stiffness simultaneously and finding the optimal values in variable stiffness control can achieve the best suspension performance with utilizing the available information of speed. By optimizing the suspension stiffness parameter of quarter-car models subjected to random road excitation with different vehicle speeds, the proposed approach ensures the model to have an optimal operating performance. The optimization method applied in this paper is Genetic Algorithm, which increases the probability of finding the global optimum solution and avoids the convergence to a local minimum. A novel criterion for selecting the optimal suspension parameters is presented in terms of the sprung mass acceleration and the dynamic force degenerated between the wheel and the ground.

Keywords: quarter-car models, genetic algorithm, multi-objective, Magnetorheological damper.