The purpose of the sliding mode controller for a vehicle suspension system is to reduce the discomfort sensed by passengers which arises from road roughness and to increase the ride handling associated with the pitching and rolling movements. This necessitates a very fast and accurate controller to meet as much control objectives, as possible. This paper deals with introducing a new technique such as Proportional Integral Sliding Mode controller (PISMC), sliding mode controller (SMC) and PID approaches to Half-Car Active Suspension to design a stability to meet the control objectives. The advantage of this controller is that it can handle the nonlinearities faster than other conventional controllers. The approach of the proposed controller is to minimize the vibrations on each corner of vehicle by supplying control forces to suspension system when travelling on rough road. Simulation results and a comparison with a classical PID controller are presented and discussed. We studied the stability of the three used controllers in the presence of disturbances. A good performance for the sliding mode controller (SMC) is achieved in simulation studies despite the disturbances.
References


7. YM Sam, NM Suaib and Jhs Osman. Proportional integral sliding mode control for half car active suspension system with hydraulic actuator. conf.on Robotics,Control and Manufacturing Technology,2008.


18. M. A. Eltantawie. Decentralized neuro-fuzzy control for half car with semi active
19. Rajeswari Kothandaraman. PSO tuned adaptative neuro-fuzzy controller for vehicle 
20. Esmailzadeh, E. and Taghirad, H.D. Active Vehicle Suspensions with Optimal 
neuro-fuzzy MR damper model and its application in vibration control of vehicle suspension 
23. Fialho, I. and Balas, G.J. Road Adaptive Active Suspension Design Using Linear 
Parameter-Varying Gain-Scheduling. IEEE Transactions on Control Systems Technology. 
10(1): 43-54, 2002
Suspension System of A Quarter Car Model Using The Concept of Sliding Mode Control. 
25. Sam, Y.M. and Osman J.H.S. Modeling and Control of the Active Suspension using 
26. T. Takagi and M. Sugeno, derivation of fuzzy control rules from human operator’s control 
actions. In: Proc. IFAC Symp. On fuzzy information, knowledge representation and decision 

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