Optimization of suspension design for a novel bike

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ABSTRACT

In this era of the energy slowly exhaustion problem and energy alternative, the domestic and overseas factories have an orientation towards energy saving, carbon reduction and energy alternative based on government subvention. This paper focuses on research the motorcycle ’ s suspension optimization. This research uses SolidWorks to build up the whole motorcycle ’ s model, its suspension; we also discuss up the suspension ’ s lever ratio and spring ratio in this study. The simulation result via BikeSim is used to solve the optimization using Multi-objective Genetic Algorithms. The optimal solution of the shock absorber is used to make the motorcycle have the better comfort and safety.

Keywords : lever ratio、Multi-objective Genetic Algorithms、comfortableness、safety

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REFERENCES

[1] 陳雲年,“摩托車基礎科學”, 摩托車雜誌社,1993.
[2] http://www.tonyfoale.com/Articles/Dive/DIVE.htm [3] http://www.atnet.it/lista/cassco.htm [4] 戴嘉緯,“控制區域網路技術應用於半主動懸吊系之連續阻尼控制”, 大葉大學機電自動化研究所碩士論文,2006.
[5] 鄭佳玟,“汽車之半主動懸吊系統的模糊控制器設計”, 大葉大學車輛工程研究所碩士論文,2007.
[6] 王俊驊,“基於控制區域網路之分散式架構應用於汽車懸吊控制”,大葉大學機械工程學系碩士班碩士論文,2007.
[7] Daniel Fischer, Rolf Iserann,“Mechatronic semi-active and active vehicle suspensions,” Control Engineering Practice, Feb. 2003.
[8] K. J. Kitching, D. J. Cole, and D. Cebon,“Performance of a Semi -Active Damper for Heavy Vehicles”, Transactions of the ASME, Journal of Dynamic Systems, Measurement, and Control, Vol.122 n3, pp.498-506, 2000.
[9] M. W. Sayers, Steven M. Karamihas,“The Little Book of Profiling-Basic Information about Measuring and Interpreting Road Profiles,” 1998/9.
[10] Abdullah Konak, David W. Coit, Alice E. Smith,“Multi -objective optimization using genetic algorithms: A tutorial”,2006. - 100 - [11] http://www.noble-bikes.com/downloads/F4_Leverage_Ratio.pdf [12] http://www.ibike.com.hk/ [13] http://www.ask.com/wiki/Hub-center_steering [14] http://www.carbibles.com/suspension_bible_bikes.html [15] 山葉機車工業股份有限公司,“NXC125T服務手冊”,2002.
[16] 陳則淳,“速克達機車之懸吊系統簡介”,2009.
[17] 經濟部工業局,“經濟部發展電動機車補助及獎勵實施要點”, 電動機車法規, 2010.
[18] 經濟部工業局,“電動機車性能及安全測試規範”, 電動機車法規, 2010.
[19] http://www.bike-mania.net/?p=131 [20]“Public Roads”, FHWA, U.S. Department of Transportation, 2002.
[21]“Standard Practices for Simulating Vehicular Response to Longitudinal Profiles of a Vehicular Traveled Surface,” ASTM E1170-92, 1992.
[22] J. H. Holland,“Adaptation in natural and artificial systems,” Ann Arbor, University of Michigan Press2003, 1975 [23] J. H. Holland,“Genetic Algorithms,” Sci. Am.,pp. 66-72, July, 1992.
[24] 周鵬程,“遺傳演算法原理與應用—活用Matlab(修訂二版)”, 全華圖書股份有限公司,2007. - 101 - [25] 陳書胤,“應用遺傳算則於壓電制動平台之件模與定位控制”, 大葉大學自動化研究所碩士論文,2005.
[26] KALYANMOY DEB,“Evolutionary Algorithms for Multi-Criterion Optimization in Engineering Design,” KanGAL., Department pf Mechanical Engineering Indian Institute of Technology Kanpur, pin208016. India.
[27] http://www.u.arizona.edu/~mwalker/05_Pareto%20Efficiency/ParetoEfficiency.pdf [28] 劉慧敏,“多目標遺傳演算法於基本面選股策略之應用”, 國立中央大學資炫管理學系碩士班碩士論文,2002.
[29] 徐業良,“多目標最佳化問題”, 元智大學機械工程研究所最佳化課程教材,2004.
[30] Serafim Opricovic, Gwo-Hshiung Tzeng,“Compromise solution by MCDM methods: A comparative analysis of VIKOR and TOPSIS”, European Journal of operational Research 156 (2004) 445-455.