

# 四輪車輛即時動態模擬之研究

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## 摘要

本研究將推導一個十自由度的車輛運動的數學模式，除了包括車身三個方向的位移和三個尤拉角，還包括四輪懸吊的變形量，一共是十自由度的運動方程式，其目的為探討車輛在轉向時車身的縱向力、側向力、和車身的偏擺率(yaw rate)，另一部份為車輛加上控制器後車身穩定的情形。本研究將模擬車輛在低摩擦路面時而且未加上控制器，方向盤快速的來回轉動，輪胎因為低摩擦係數的原因導致車胎的側向力和縱向力降低，所以沒有辦法維持車身的穩定，最後車身會有打滑的趨勢，但是當車輛加上控制器後，控制器會控制前兩輪，當車身打滑時，控制器會控制前輪其中的一輪，如此來增加或減少車身的偏擺率(yaw rate)，在設計控制器時我們經由模擬的結果得知，方向盤與車身偏擺率(yaw rate)之間的關係，在經由不同方向盤角度的測試，我們則可以找出方向盤與車身偏擺率(yaw rate)之間增益的變化情形，利用這兩個訊號和之間的增益，設計出車身穩定的控制器，並且得到車輛動態的模擬與結果。

關鍵詞：模糊控制、動態、車身穩定

## 目錄

封面內頁 簽名頁 授權書.....	iii	中文摘要.....	iv	英文摘要.....	v
誌謝.....	v	目錄.....	vi	表目.....	x
圖目錄.....	vii	符號說明.....	xiv	第一章 緒論.....	1
1.1 前言.....	1	1.2 文獻回顧.....	5	第二章 三維車輛系統數學模式.....	7
2.1 三維車輛的運動方程式.....	7	2.2 路面幾何與輪胎接觸點的判斷.....	10	2.3 輪胎的正向力與接觸點的數學模式.....	12
2.4 輪胎的特性與數學模式.....	14	2.5 兩輪轉向系統.....	27	2.6 利用Solidworks 和虛擬實境(VR)所建立的幾何外型.....	29
第三章 三維車輛動態數值分析.....	32	3.1 程式設計的架構.....	32	3.2 數值模擬與驗證.....	34
3.3 車輛前進煞車時的動態分析.....	38	3.4 車輛連續轉動方向盤時的動態分析.....	40	3.5 車輛切換路徑時的動態分析.....	41
3.6 車輛行進間將前輪煞車的動態分析.....	42	3.7 方向盤與車身yaw rate 之間的關係.....	45	第四章 車身穩定控制器的設計.....	48
4.1 模糊控制的理論.....	48	4.2 控制器的設計架構.....	50	第五章 模擬結果與數值分析.....	57
5.1 方向盤連續轉動之模擬.....	57	5.2 閃避障礙物之模擬.....	61	第六章 結論.....	65
參考文獻.....	66				

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