

論文名稱：構建機車運度推進模式

----以魚體運動模式概念為基礎

頁數：95

校系（所）組別：淡江大學 運輸管理學系運輸科學碩士班

畢業時間及提要別：九十三學年度第一學期碩士學位論文提要

研究生：邱德紋

指導教授：范俊海 博士

論文摘要

自從有人提出車流類似流體的概念後，日後以流體為基礎的車流模式漸漸增多，有鑑於此，本研究以車輛在流體中類似魚群在水中游為啟發，認為車輛行進時，有如魚類一般，由視覺蒐集資訊以做出行進的決策，故在魚體運動模式的研究中發現一篇針對偏向角為主的運動模式，符合本研究的概念，故藉此概念為基礎，以發展一套機車運動推進模式，藉以描述其運動狀態。

經過反覆的思考，本研究將機車運動推進模式分為縱向推進與橫向推進兩部分，而導致其分做兩部分的為偏向角，故若模式的橫向位移與縱向位移與真實機車運動軌跡越接近時，代表其透過模式所得到的偏向角度與真實機車的偏向角度將會越接近，本研究在橫向位移的表現上，皆有六成以上達到可接受範圍，即誤差範圍在 0.2 公尺內，有八成五以上誤差範圍則在 0.4 公尺內，而在縱向位移的部分，有超過六成的誤差範圍在 0.005 公尺內，亦有八成以上誤差範圍在 0.01 公尺內。而本研究最後也應用模式預測機車運動軌跡與求得最小安全超車距離，在預測運動軌跡方面，結果顯示能達到可接受的範圍，而在最小安全超車距離方面，當相對速度為 10 公里/小時，其可安全超車之最小縱向距離為 5 公尺、橫向距離為 0.6 公尺，相當於相對距離為 5.04 公尺，且此時之偏向角度為-0.8275 度，而當相對速度為 20 公里/小時，其可安全超車之最小縱向距離為 3 公尺、橫向距離為 0.4 公尺，相當於相對距離為 3.03 公尺，且此時之偏向角度為-0.9862 度。

本研究首度引用魚體運動模式中參考點與重心法的概念來構建機車運動推進模式，再經過參數校估及模式驗證後，證明本研究以魚體運動模式概念所構建的機車運動推進模式確實具有可行性。

關鍵詞：機車運動推進模式，偏向角，最小超車安全距離

Title of Thesis :

Total pages : 95

Building a New Motorcycle Motion Model---Based on the Concept of Fish Motion

Key word : Motorcycles, Angle of deviation

Name of Institute : Graduate Institute of Transportation Science, Tamkang
University

Graduate date : Jan 2005

Degree conferred : Master

Name of Student : Te-Wen Chiu

Advisor : Dr. Chun-Hai Fann

邱 德 紋

范 俊 海 博士

Abstract

Since someone brought up that the traffic flow is similar as fluid flow, we think the motion of the motorcycles feels like the fish swimming in the water and the way of the drivers collecting informations by vision also is similar to fish. Therefore we found out a research about the motion of the fish, the article about the movement pattern in the view of angle of deviation in that research conforms to the concept of this research. So we will develop a set of motion of motorcycle based on the concept of the fish motion model.

In this study, the motion of the motorcycle is divided into the longitudinal moving and the traversal moving according to the angle of deviation. When the longitudinal moving and the traversal moving approach with the original data, it means the angle of deviation is closer to the original data, in the performance of traversal moving in this research, above six tenths achieved the acceptable scope (the erroneous scope is in 0.2 meter), above eight point five tenths achieved 0.4 meter in erroneous scope, but at the longitudinal moving part, there is above six tenths in the erroneous scopes of 0.005 meter, and above eight tenths in the erroneous scope of 0.01 meter. In the final part of the research, we apply the model to forecast the motion trajectory of the motorcycle and to seek the shortest distance of overtaking. The former can have an effect in the reasonable range. There are two situations at the aspect of the shortest distance of overtaking, one's the shortest distance of overtaking with a relative velocity of 10 km/hr, the shortest safe overtaking distance in longitude of the vertical is 5m, the distance of the horizontality is 0.6m, is equal to the relative distance of 5.04 meters, and the angle of deviation is -0.8275. When the relative velocity is 20 km/hr, the distance of the vertical is 3m, the distance of the horizontal is 0.4m, is equal to the relative distance of 3.03 meters, and the angle of deviation is -0.9862.

This research used reference points and center of gravity these two concepts of fish motion model to construct the motion of motorcycle, to prove the model in this study is feasible after parameter calibration, model verification and model validation.