坦克車輛三維動態模式建立之研究

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摘 要

本研究主要為建立一數學模型，且可充份描述完整三維坦克車輛之動態特性。在此，考慮系統模型是由車體、砲塔與砲管所構成的多剛體組合件，所以定義一參考點作為基準點，並使用Lagrange quasi-velocities方法推導運動方程式，其中在推導過程裡，導入許多條件限制與空間幾何學等，以利計算地輪間所承受的接觸力，此一連串將複雜模型簡化所需步驟之目的，為以達到日後朝向即時模擬目標。 有鑑於此，在本研究推導數學方程式的過程中，為有系統且有效率的整理計算數學方程，因此藉助數學符號軟體MAPLE輔以計算。接著，依照數值方法帶入模型參數求解微分方程，並遵循能量守恆之觀點給定初始條件，以驗證模型之正確性。在電腦模擬方面，將於本研究中使用3D繪圖軟體建立完整三維坦克車輛電腦模型，進而經轉檔之方式匯入高階動態模擬軟體，接著定義各動件的限制條件並進行模擬。 接著，將測試本研究之數學模型完整性，依照不同CASE進行動態模擬分析並配合電腦模型相互驗證比較，其中包含針對平坦路面直線行駛加速與減速、行駛上下坡地形與轉向彎行測試，作一詳細探討結果。

關鍵詞 : 坦克車輛，接觸力，quasi-velocities，即時模擬

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