

滾籠型運動越野電動車翻覆強度之探討

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摘要

近年來各國提倡環保與節能概念，各大車廠均積極投入電動車之研發以降低環境污染與噪音，目前有關電動車之研發大多著重於電池以及電控系統，對於小型運動越野電動車結構安全則少有文獻探討，本文乃參考2010 Baja SAE Rules設計一款電動Mini Baja車架，以Clifford等人提出之墜落型、跳動型與美規FMVSS 208側向翻覆法規之測試程序，探討電動Mini Baja越野車結構安全與重心動態反應。首先建立簡易模型驗證翻覆數值環境之正確性，其次應用工程繪圖軟體Solidworks與有限元素前處理軟體Hypermesh進行電動Mini Baja車架繪製與網格劃分，最終使用有限元素分析軟體LS-DYNA進行電動Mini Baja越野車翻覆模擬分析，由於電動車配載電池與馬達，造成電動Mini Baja越野車重心有所改變，且Mini Baja越野車為滾籠型車架，模擬分析後有不同翻覆表現，本文評估重心動態反應與車架結構損傷之後，發現小型電動車重量遠比小客車輕，若以法規測試速度進行翻覆過於嚴苛，故於文中探討測試速度應為Mini Baja 4小時耐力賽之平均速度較為適切，並依上述測試程序再次進行模擬分析所得結果亦較為合理。本文之研究成果應可提供往後小型電動車側向翻覆測試與設計之參考。

關鍵詞：SAE Mini Baja、LS-DYNA、FMVSS 208、側向翻覆

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