Motion analysis of a novel robotic wheelchair on climbing winding stairs

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摘 要
本研究主要是設計一新的爬樓梯機器人輪椅，並分析其穩定度，運動狀態及建立相關之動態模型。該機器人輪椅主要是由樞接在支撐基座兩側之多肢節結構所組成，以使該機器人輪椅可以上下階梯；特別強調是具有上下螺旋階梯之能力。此外，構成多肢節結構體之短臂、長臂及三角支座之轉動是由周轉複合行星齒輪系來致動。該具轉動之多肢節機構除應用於階梯上下，並可保持身體基座水平而無需附加之伺服機構，且所提出之機器人輪椅設計更顯示其相關操控程序之簡單性。上下螺旋階梯之動態模型則是依據側滑轉向分析所推導以作為軌跡規畫及運動分析。該運動模型主要是確使操控者可以開模式安全地操控該機器人輪椅。除此，本論文亦提出等效拘束法來規畫該機器人輪椅上下螺旋階梯之運動軌跡。模擬及實驗結果顯示該機器人輪椅可以動態轉向方式上下螺旋階梯。

關鍵詞: 機器人輪椅、上下階梯、螺旋階梯、動態轉向、等效拘束運動規劃

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[6] Wheelchair Foundation was established by Kenneth E. Behring in June 13, 2000 at a ceremony on Capitol Hill in Washington, DC
http://www.wheelchairfoundation.org


