無人搬送車의最適操向制御

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Study on Optimal Steering Control of an Unmanned Cart

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Key Words: Unmanned Cart (無人搬送車), Steering Control (操向制御), Optimal PI-Control (最適比例及積分制御), Lateral Displacement (橫位移), Yaw Angle Deviation (yaw 각偏差)

Abstract

An optimal control procedure is presented for steering of an unmanned cart which has two motored wheels on its left and right side. Steering, running and stopping are enabled by controlling the motor speed independently.

An optimal proportional-plus-integral control is employed to eliminate steady state error which is sustained by a simple proportional control for tracking a circular arc path. A simple and readily-implemented suboptimal control is also examined. The suboptimal control gives comparable performance and therefore provides an effective approach for industrial application of the unmanned cart.

Effects of design parameters of unmanned cart such as forward velocity, wheel radius and position of sensor are investigated. It is shown that within the practicable values of the parameters the controlled performance improves rapidly with increase of those parameters then the improvement becomes negligible, which suggests base values over which the parameters should be taken.

1. 論 論

無人搬送車(autoguidedvehicle, unmanned cart)는運転者 없이物件を運搬する自動化機械로서工場自
動化を図る為に不可欠分要素である。乘客運送用

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無人車의操向制御에 있어서는 이미 많은研究가発表

된 바 있다(1,2). 이들은無人車의操向装置로서自動
車의 같이4개의バキューム 갖고 앞의 두바퀴方向を変
化시킬므로操向이 이루어지는形式을考慮하였다.

그러나 대부분의貨物運送用無人搬送車는これとの
操向構造を 가지며 Fig.1에無人搬送車의一般的な操
向構造を 보였다. 그림에서 보는 바와 같이二個의
キャスター와左右에二個の動力バキューム 가지고 있으며