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MODELING AND ANALYSIS OF A TRACTION CONTROL SYSTEM FOR TWO INDEPENDENT WHEEL DRIVES-ELECTRIC VEHICLE

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Abstract. Recently electric vehicles (EVs) including fuel-cell and hybrid vehicles have been developed very rapidly as a solution of energy and environmental problems.
Since electric motors and DC chopper are utilized in drive system, they have great advantages over internal combustion engine vehicles (ICVs) such as quick and comprehensible torque response and individual control of each wheel and mechanical components reduction and allowing a better performance.
The usual configuration of electrical or non-electrical vehicles presents only one traction motor driving two wheel, using a differential gear. In this paper, a structure of vehicle was adapted allowing to obtain a vehicle with two independent wheel drives see Fig.(1).
A first step in reduction of mechanical transmission components is related to the elimination of the mechanical differential gear introducing an electronic substitute system, called electrical differential.
These systems objectives can be implemented in EV's in a much more easier and adapted way. The natural ability of electric drives to control the generated torque and the introduce an independent control of the traction wheel drives (two or four) can allow high performance traction control with a low cost, a quick response and easy to design implementation. A vehicle topology like the proposed one allows a simplified mechanical structure of the vehicle and an effective traction control will allow to reduced the energy consumption, namely by diminishing energy losses from the friction between the tires and the road surface during sliding, improving the tires lifetime.
Now, in this proposed system some assumption taken in that as:

- The uses of P-D controller with logic control and sensor control to analyze the possible sliding of the vehicle. With the acquisition of this value, the torque in each wheel could be controlled.
- The adhesion coefficients on the left and right side of the vehicle could be different. Therefore, it is necessary making possible the steerability and stability of the vehicle, that is the task of the traction control algorithm to be introduced.
- Simulation result will concentrate on the following:

1- Comparison between two different output voltage of dc chopper.

2- Turns left and turns right of vehicle

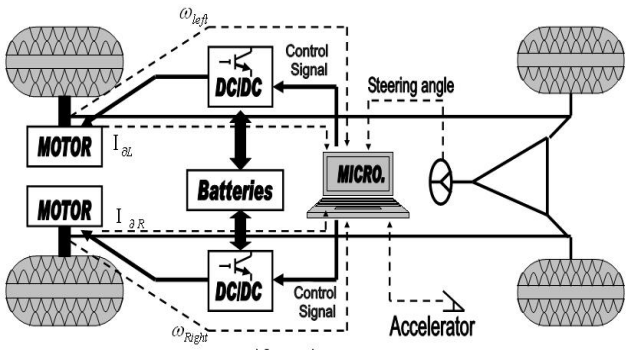

Fig. 1. Configuration Of Proposed Electric Vehicle.

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