Real-time power distribution for energy conservation on an electric vehicle driven by multiple traction motors

**Introduction**

A pure EV driven by a powertrain of three DYC and SRC angle.

**System - A pure EV driven by a powertrain of three traction motors: an indirectly-driven traction motor for front wheels and two in-wheel motors inside both rear wheels.**

**Energy Saving – Real-time determination of the torque distribution of 3 motors for minimizing energy consumption.**

**Safety – Vehicle stability control with electric propulsion failure detection and tolerance control.**

**Methods –**

Real-time particle swarm optimization (R-PSO) according to the torque-speed-efficiency maps of the three traction motors.

Vehicle stability control system

slip ratio control, direct yaw-moment control based on sliding mode control.

**Experiments – (Hardware-in-the-loop, HIL)**

**Results –**

**Parameter Identification process**

<table>
<thead>
<tr>
<th>battery model</th>
<th>max voltage error (V)</th>
<th>mean voltage error (V)</th>
<th>max voltage error (%)</th>
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</thead>
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<td>IDmodel</td>
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</tbody>
</table>

**Conclusions –**

1. Energy-saving strategy - the PSO algorithm provides a sub-optimal, but real-time and applicable, energy-economy driving for EVs.
2. Safety - DYC and SRC guarantee the vehicle stability and handling.