N. project: L1-91

category: Rail

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RA3

Advanced Propulsion Systems

Algorithms for energy saving on dual source railway vehicle

he aim of this project is to save consumed energy in dual source railway vehicles with better control algorithms.

A dual source railway vehicle is a light railway vehicle unit with the battery for an operation on nonelectric section – something like the unit EV-E301 in Japan. Firstly, it simulated the operation of a real Czech unit with traction battery.

Next, it resolved the optimal movement trajectory of the vehicle. On the base of this trajectory, the software for automatic train operation was designed by GPS. In first phase, the standard PSD speed controller was modified (a part was added with feed forward optimisation). The optimisation of energy consumption was confirmed by a predicted change of the track resistance. The project aim is to create a state machine in vehicle control computer, which will operate with optimal movement trajectory. This trajectory consists of the jerk - transition from static to acceleration state (for this part, comfort is preferred against energy saving), acceleration, constant speed ride and braking (where energy saving is preferred).

The optimal movement trajectory will provide a comfortable vehicle ride and mainly traction energy savings. More energy remains in the battery if we can make less traction consumption. This means that vehicles will ride longer distances on non-electric sections •

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