
The FLmRB Toolbox and Data Sets

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Instructions

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This toolbox contains the data sets gathered from two long-distance tests in urban and suburban areas, and used to evaluate the FLmRB proposed in the paper [1] (please see below), and the simulation script to run the corresponding tests in MATLAB™.

To run the script, first install the script and the data sets, unpacking the file **FLmRB.zip** in any folder. Then, run the MATLAB™ software, make the FLmRB folder the current folder, and run the script **startFLmRB.m**.

The script will prompt the user (*i*) to choose which test it is intended to be run (Test#1 or Test#2) or to cancel the simulation, (*ii*) to choose to perform the simulation either using the FLmRB fuzzy model or not using it (i.e. considering 100% regeneration), and (*iii*) to select in a GUI the folder where to save the variables generated in the simulation.

The script was tested with success both in Windows and Linux machines.

The Format of the Data Sets

The data sets files are structured in the CSV (Comma Separated Value) format, and their filenames (**Test#1.csv** and **Test#2.csv**) are self-explanatory. The files have five fields per line, where each line corresponds to one time interval (the time step), where as reported in the paper [1] the time interval is 10^{-1} [s]. The meaning of the fields is as follows, from the first to the last column of the files:

- Vehicle speed [ms^{-1}];
- Road inclination [rad];
- Battery current [A];
- Battery voltage [V];
- Battery State of Charge (SOC) [%].

Additional Files: Lookup Tables

Default open circuit battery voltage and internal resistance as a function of the SOC:

`Eoc.mat`, `Rin.mat`, and `SOC.mat`;

Efficiency of the electrical traction motor of the Leaf as function of speed:

`leafEfficiency.mat`, and `leafEfficiencyNeg.mat`;

Maximum torque of the electrical traction motor of the Leaf as function of speed:

`leafTqMaxPos.mat`, and `leafTqMaxNeg.mat`.

Reference

Please cite the article as follows:

- [1] Ricardo Maia, Marco Silva, Rui Araújo, and Urbano Nunes, “Electrical Vehicle Modeling: A Fuzzy Logic Model for Regenerative Braking”, *Expert Systems with Applications*, Vol. 42, No. 22, pp. 8504-8519, Elsevier, December, 2015. <http://dx.doi.org/10.1016/j.eswa.2015.07.006>