

This paper provides a new approach for emulating road load conditions for an electric-drive vehicle (EDV) system on a test bench setup consisting of a drive motor (DM) connected to a dynamometer. Two different methods of EDV emulation are discussed, which are based on a predefined drive cycle and unpredictable driving behavior. The effect of total vehicle inertia is considered for both scenarios, and a control scheme is developed for each case based on vehicle equivalent rotational inertia. This method of EDV emulation not only takes into account all of the stress imposed on the DM due to vehicle inertia effect, but also allows electric vehicle emulation for any standard drive cycle, as well as undefined driving scenarios. Simulations are conducted for each case using a MATLAB/Simulink test bench model, and the results are validated using ADVISOR, a well-proven software package, to confirm the effectiveness of the proposed method. To investigate hardware-in-the-loop real-time performance, each method is applied to the experimental test platform, and the accuracy of the experimental results is compared to the results obtained from simulation.