Reviewer Report on Abdulkadir Zirek Master Thesis "Anti-slip Protection and Control of the Traction Motor of a Rail Vehicle"

The Abdulkadir Zirek work is oriented on analyzing and comparing five algorithms of anti-slip protection methods for railway traction vehicles: velocity difference control method, slip control by reference wheelset method, slip control by angular acceleration of wheelset, slip control with reference slip generator and steepest gradient method with PI controller. Analysis of each method is implemented using a computer simulation model. Simulation models of methods are implemented in Matlab.
In the first part of the work are given basic knowledge from the area of the theory of slip and adhesion and from the principles of the main methods of anti-slip protection. The simple methods, using as input the information just the immediate value of the speed of the wheelsets of the vehicle are presented, and also methods, which require knowledge of the actual values of the reference speed of the vehicle.
The second part of the work presents the concept of the main simulation blocks of the simulation model. Detailed dynamic model of locomotive with two wheelsets ist described here. The next section describes the principle of model slip properties according to the theory of Freibauer/Polach. Wheelset electric drive of the locomotive with torque feedback control is modeled simply as a first order system.
The third part of the work contains a description of the five anti-slip protection algorithms that have been simulated and compared.
The fourth part shows the results of the simulation calculations for five variants of anti-slip protection.
In the last part of the thesis are presented the conclusions and is compared the quality of the five studied anti-slip protection.
The structure of the work and the techniques used to problems study based on simulation models are chosen appropriately, and correspond to the capabilities of the student. For the practical use are the most simple methods that use only information about the instant speed of rotation of the wheelsets, but these methods do not provide high quality anti-slip protection.
First, theoretical parts of the work, have a good formal quality, are clear and well understandable. Chapter 5, where are the results of the simulations, it is also clear and provides a good overview of the properties of the variant anti-slip protection.

To the work I have these comments:

1. In the work is used a big number of symbols that are not explained in the title list of symbols or in the text.
2. In the chapters 4.2.4 and 4.2.5 is a very unintelligible description of methods anti-slip protection with reference slip generator and steepest gradient method with PI controller. In these chapters don't correspond mathematical descriptions of the methods and block diagrams methods on figures 17 and 18. The student must accurately explain the principles of these two methods by defense.
3. The work contains big number of equations without numbering.
4. The symbols A, B, kred in Chapter 5 are not explained.
5. What is the numeric value of the time constant of the motor (torque feedback control) in the simulations (Chapter 3.3)?

I grade work **Very good** and I recommend for the defense.

In Pardubice 2015-06-01

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