ASSESSMENT OF THE MASTER THESIS

Topic name: Anti-slip protection and control of the traction motor of a rail vehicle
Student: Bc. Abdulkadir Zirek
Specialization: Transport Means, Railway Vehicles

The work is complete in terms of the requirement to enter, the student has fulfilled all points of entry.
The student progressed in solving actively and independently.
The student knowledge of practice and literature.
The expert-level work is at a high level.

The student compiled a simple mechanical model of vehicle, model of adhesive binding and model of electrical parts. He carried out the algorithms of simulation of the starting of the vehicle. Programmed and simulated the several methods of antislip control and compared these methods.

Now we focus to root of problematics:
- mechanical model, O.K.
- model of adhesion link, O.K.
- model of slip control, page 38, capture 4.2 – defectes:
    1. method – Velocity difference control method, p.38-39
       Questions: What it is „a"? Protection constant (a=0.5)?
       What is dx_w? First derivation? At Fig.14 is the mistake, 2 times is dx_{w1}; What is the $dQ_{w1,2}$? Q – is at „List of symbols…" vertical load of wheelset. The Q_w, resp. dQ_w is not refereed at „List of symbols…".
       Is Q_w angular speed of wheelset? If yes, marking is inappropriate.
    2. method – Slip control with reference wheelset, p.39-40
       Questions: Is the (n-1) values at previous (n-1)-time step, for prediction n-step?
       How is difference between moment $M_{k1,2}$ and moment $M_{m1,2}$?
    3. method – Slip control by angular acceleration of wheelset
       Questions: Insufficient – the Q is load of wheelset? Why is at block diagram – Fig.16 – it-s not angular acceleration? The match between the formulas and the block schema and „List of symbols…" is not.
    4. method – Slip control by reference slip generator, p.41
       Questions: Insufficient – all equations is not numbered!! What is the „α" and „β"? insufficient between block diagrame and formulas (parameters at block schema is not at formulas).

5. method – Steepest gradient method with „PI" controller

Questions: What is „β"? What is „Kp" „Ki"? It is not refereed at the „List of symbols…".

Next questions:

- In graphs: slip – what is the physical unit? Is it at „percentage"?
- block diagrams – who is the author, you or according some literature?
- dimension (physical units) absent at „List of symbols…".
- what is the V(n)=? Absent at „List of symbols…". How is physical dimension of formulas at p.41, 42? – What is the vref - speed? (is not at „List of symbols…")
- why are they not in the work used the symbols for <u>angular speed</u> „φ"?? And slip „s"?? (slip „s" is not at „List of symbols…")

Please make a student has prepared answers to the questions.

I believe that these shortcomings in the marking of variables, the disproportion between the block diagrams and formulas are the <u>only formal,</u> <u>since the simulation model works correctly,</u> as seen from the charts.

The most major result of this work is, that student according to results as most preferable method can be „Slip control with angular acceleration of wheelset."

I recommend this diploma thesis for the defence.

The work was a mark:

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„Very good (2,0)"

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Pardubice, 1.6.2015   doc. Ing. Michael Lata, Ph.D.