Doctoral dissertation topics for the academic year 2016/2017
Branch of study: Transport Means and Infrastructure

1. Indirect Microwave Holography

Supervisor: prof. Ing. Vladimír Schejbal, CSc.

Form of Study: full-time/part-time

Abstract:

The basic theory of indirect microwave holography and how it can be used for the determination of antenna far field patterns and the reconstruction of antenna aperture fields. Analyses how the technique can be used for both planar scanning and cylindrical scanning. Measurement analyses for medium gain antennas of wide spectral extent and imaging of concealed metal and dielectric objects. That allows imaging of a metallic gun concealed in a pouch. That could be used for security imaging applications such airport and bus and railway stations.

2. Simulation and Optimization of Electrical Energy Storage at Power Engineering

Supervisor: doc. Ing. Radovan Doleček, Ph.D.

Form of Study: full-time/part-time

Abstract:

The thesis will deal with operation of energy networks for transport systems. The goal is to evaluate the effectiveness of the use of power storage units for transport systems.

1) The overview of the concepts and topologies of power accumulator units
2) The analysis of the suitability of individual concepts
3) The proposal of methodology and management strategy of these power units
4) The design of mathematical models including the whole system
5) The experimental verification for applications including conclusions and recommendations

3. Model of Train Energy Performance

Supervisor: doc. Ing. Radovan Doleček, Ph.D.

Form of Study: full-time/part-time

Abstract:

The thesis will deal with creating of the mathematical model of computing the driving performance of trainset with different transport capacity driven by an electric locomotive or an electric drive unit to the selected track sections. The proposed mathematical model will be validated by meter data and real expected consumption of contract specific consumption of energy.

4. Effects of Glue Joints Arrangement of Slab-Type Materials to the Strength of Joints

Supervisor: doc. Ing. Pavel Švanda, Ph.D.

Form of Study: full-time/part-time

Abstract:

Aim of this work is to find relation between strength of glue joint and material properties (strength, modulus of elasticity) of adherend and glue. Work will consist of theoretic definition of stress distribution inside of glue joints using FEM calculation. Computer models will be comparing with real samples. Finding of empirical relation (equation) that represent dependence of strength of glue joint vs. their design (proportions and materials properties)

5. Development and Design of Accelerating Device for Dynamic Testing of Transport Vehicle Materials.

Supervisor: prof. Ing. Petr Paščenko, Ph.D.

Supervisor-specialist: Ing. Petr Tomek, Ph.D.,

Form of study: *Full-time, Combined.*

Abstract:

A special percussive hammer is presently developed at Jan Perner Transport Faculty (JPTF) of University Pardubice for purpose of high-speed load testing of material characteristics of rail and road transport mean components. The hammer reaches, compared with a classical hammer, increased speed at the bottom dead center (BDC, test specimen position - tensile impact test). This is due to the hammer acceleration device located at top dead center (TDC). Presently, the development of the pneumatic acceleration device is finishing at JPTF. It accelerates the percussive hammer to the theoretical speed at BDC *15÷20 m/sec*. The subject of this thesis is the development and design of advanced accelerator where the source of kinetic energy of the ejection piston with hammer is the powder charge. The theoretical speed of the hammer at BDC is assumed *35÷40 m/sec*. Besides technological calculations, it is necessary to perform a complete FEM strength and fatigue analysis of exposed machine parts where both mechanical and thermal load have to be considered. Moreover, the possible resonant vibration induced by firing of the powder charge should be also investigated. An important part of the dissertation is the development of a methodology to determine the number of safe working cycles of the acceleration device. The results of theoretical research will be verified experimentally.