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Zdzisław Chłopek

### **The assessment of the pollutant emission from the self ignition engine in its different operating states**

Paper presents the results of pollutant emission tests from the self ignition engine in various states of its operation. Engine operating states were obtained on the engine test stand. The investigations were conducted in static and dynamic tests, both standard used in the type approval procedures as special ones, simulating specific engine operating conditions. The specific brake emission of carbon monoxide as well as those of hydrocarbons, nitrogen oxides and particulate matter, averaged during the tests, have been determined. The influence of the engine operating states on the pollutant emission of impurities has been evaluated. Very high sensitivity was established of the pollutant specific brake emission on the operating states of the engine, both static ones and dynamic.

Markus Hecht

### **Innovative rail freight wagons – a precondition to increase the market-share of rail freight**

Rail transport is a very important type of transport. Due to its environmentally friendly nature it is necessary to dedication him considerable attention. The article stated the need for the implementation of innovative solutions for wagons. This article presents precondition to increase market share of rail freight. Considerations that must be met by modern rail transport were presented in details. The main focus was on provide assumptions to implement innovative wagons and their areas of influence.

Mariusz Izdebski

### **The use of heuristic algorithms to optimize the transport issues on the example of municipal services companies**

In this article the main optimization problems in the municipal services companies were presented. These problems concern the issue of vehicle routing. The mathematical models of these problems were described. The function of criterion and the conditions on designating the vehicle routing were defined. In this paper the hybrid algorithm solving the presented problems was proposed. The hybrid algorithm consists of two heuristic algorithms: the ant and the genetic algorithm. In this paper the stages of constructing of the hybrid algorithm were presented. A structure of the data processed by the algorithm, a function of adaptation, a selection of chromosomes, a crossover, a mutation and an inversion were characterized. A structure of the data was presented as string of natural numbers. In selection process the roulette method was used and in the crossover process the operator PMX was presented. This

algorithm was verified in programming language C#. The process of verification was divided into two stages. In the first stage the best parameters of the hybrid algorithm were designated. In the second stage the algorithm was started with these parameters and the result was compared with the random search algorithm. The random search algorithm generates 2000 routes and the best result is compared with the hybrid algorithm.

Andrzej Majka

### **Multi-objective optimization applied for planning of regional European airline**

Fleet planning is very important elements in the airlines planning process. Fleet planning should answer the question which types of aircraft are required and how many of them are required taking into account the current and future transportation needs. Decision-making in the field of operations has a character of engineering. This process requires consideration of many factors, dependencies and criteria. The article presents the decision problem formulated in the form of a multi-objective mathematical model. This work preliminarily determines the structure of the transportation system which performs carriages on the local routes.

Valentinas Podvezko, Henrikas Sivilevicius, Askoldas Podvezko

### **Scientific applications of the AHP method in transport problems**

In methodologies of solving different transport problems where the best decision has to be determined usually a number of chosen quantitative criteria are incorporated, which describe qualitative parameters of transport systems in quantitative terms. Often weights which reveal importance of such criteria must be evaluated. The realm of proprietary methods used in engineering sampling and experimental studies does not comprise methods of weight evaluation. Consequently, expert evaluation methods, which elicit weights of criteria from experienced, qualified and fair experts, are used. Among the most popular such methods is the method AHP (Analytic Hierarchy Process). Scientists of Vilnius Gediminas Technical University used this method for investigation of interrelationship of elements of a transport system; for evaluation of influence of the interrelationship on road traffic safety; and for evaluation of quality of passenger railway transportation service.

Andrzej Szarata

### **The multimodal approach to the modelling of modal split**

Transport in cities plays a crucial role in the lives of inhabitants. Development of cities affects the functional aspects of the network include the emergence of new areas of traffic generators. Unsuitable infrastructure causes many negative effects that outraged the standard of living in cities. In this paper the concept of Park and Ride was presented as a way to cope with the growing volume of traffic. Full procedure for estimating the contribution of different modes of transport including the Park and Ride was presented. Additionally, an important part of the

article is devoted to a description of full Delphic approach, applied for membership function (MF) shape definition of chosen function, estimating linguistic variable.

Janusz Szkopiński

### **The certain approach to the assessment of interoperability of railway lines**

This paper presents the main aspects concerning the systemic approach to the problem of interoperability of rail transport. Following decision about the opening of the EU market and transport services for rail transport, the European Parliament and of the Council have introduced a number of interoperability directives for implement interoperability on the rail system in EU. Their goal was to get the integration of rail transport systems, despite the differences in control-command and signaling systems, power supply and operation system, to be rich on the safe and not disrupted train running over the different countries (different infrastructure managers). The article indicated the main areas in the railway system which are depends on strongly of the interoperability implementation.

Renata Żochowska

### **Selected issues in modelling of traffic flows in congested urban networks**

Making rational decisions about the planning and designing the traffic management in the city requires a proper description of traffic flows following through the various elements of the transportation network. This issue is the subject of many studies, resulting in a wide variety of models used in this field. Generally they can be divided into two main groups: models describing the distribution of traffic flows in the transportation network and models describing the transition of traffic flow by individual elements of the transportation network. This article reviews the models used to describe the traffic shaping in such an arrangement. Then the way of describing traffic flows, which may be used in the construction and calibration of dynamic traffic models has been formalized. The article also includes a calculation example with application of the proposed description of the components of traffic flows on the link of urban network.