Evaluation and attenuation of vibrations in the system road-vehicle-driver

Hodnotenie a znižovanie kmitania v sústave vozovka-vozidlo-operátor

**Funding:** National (Slovakia)
**Duration:** Jan 2013 - Dec 2015
**Status:** Complete with results

**Objectives:**
The project deals with assessing and reducing of vehicle vibration caused by longitudinal road profiles and vehicle auxiliary machinery.

**Methodology:**
The relation between unevenness, its description and vehicle vibration response with regard to roll of the wheel on track will be comprehensively addressed.

Currently used road unevenness indicators will be mutually compared.

The sensitivity and possibility to reflect the quality of road surface for different random profiles combined with controlled parameters of impulse components will be evaluated.

The correlation between road unevenness and vehicle vibration response will be assessed.

The suitability of unevenness indicators to reflect ride comfort, ride safety and vehicle and road dynamic loading will be evaluated.

The possibility of reducing the vibration of auxiliary machinery located on the vehicle frame by semi-active actuators will be analysed.

A test stand with electro-magnetic actuator will be constructed and its vibro-isolation effect will be evaluated.

**Parent Programmes:**
VEGA - Scientific Grant Agency

**Institute type:** Research agency
**Institute name:** Scientific Grant Agency

**Funding type:** Public (national/regional/local)

Slovak Academy of Sciences, Institute of Materials and Machine

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**Key Results:**
The project has following results:

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The relationship between longitudinal road unevenness, inequality indicators and vehicle vibration responses was analysed considering the rolling of the wheel in the track. A new classification of longitudinal road inequalities based on inequality spectrum parameters has been proposed, which takes into account the vibration and speed of the vehicle, the rolling of the wheel and the properties of real roads. The correlation between the indicators of road inequality and vehicle vibrations has been evaluated and the suitability of indicators to predict ride comfort and safety. The influence of local road disturbances has been determined on various inequality indicators and the ability of indicators to evaluate the random and impulsive component of the profile. The impact of the different road-tire contact patterns has been compared to the vibration response of the vehicle. An appropriate model of the coherence function of inequalities in the parallel tracks of the vehicle was determined by processing real profiles. The limits of the IRI indicator used in the Slovak Republic were determined compared to the 18 used and 14 innovative inequality index proposals. The new principle of magnetic vibration damping based on the whirling currents is patented. Theories and experiments have shown better vibro-insulating properties of the proposed bellows-free damping device.

**STRIA Roadmaps:** Other specified

**Transport mode:** Road transport

**Transport sectors:** Passenger transport, Freight transport

**Geo-spatial type:** Other