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DEVELOPMENT OF A SOFTWARE FOR MODELING OF VEHICLE EXCITATION DUE TO THE ROAD ROUGHNESS

Current problems regarding the recording and modeling of vehicle excitation due to the road roughness are pointed out in the paper. Mathematical bases for description of homogenous and isotrope random surface of the road are presented. A block-diagram of coupling between statistical characteristics of the roughness of one longitudinal section and statistical characteristics of road surface roughness containing this section is formed. On the basis of this diagram, a software for defining of vehicle excitation in two parallel tracks (sections) based on available measurement data of one longitudinal section is developed. Suggested procedure is illustrated with exponential models of the power spectrum density of longitudinal road roughness section, as input characteristics. Calculation results are presented in a form of auto- and cross- correlation functions, as well as equivalent and normalized power cross-spectra of parallel road roughness tracks. During the analysis of the results, it has been pointed out to the possible selection of characteristic parameters for evaluation of the quality of the road and, by that, the intensity of vehicle excitation.

Key words: road roughness, software, correlation functions, coherence function, spectra

RAZVOJ SOFTVERA ZA MODELIRANJE POBUDE VOZILA OD NERAVNINA PUTA

U radu su istaknuti aktuelni problemi u vezi sa snimanjem i modeliranjem pobude vozila od neravnina puta. Date su matematičke osnove za opis homogene i izotropne slučajne površine kolovoza. Formiran je blok dijagram sprege statističkih karakteristika neravnina jednog podužnog preseka i statističkih karakteristika neravnina površine kolovoza kojoj pripada taj presek. Na osnovu toga razvijen je softver za definisanje pobude vozila u dva paralelna podužna traga (preseka) na osnovu raspoloživih podataka merenja u jednom podužnom tragu. Predložena procedura je ilustrovana sa eksponencijalnim modelima gustine spektra snage podužnog preseka neravnina, kao ulaznim karakteristikama. Rezultati proračuna su prezentirani u obliku auto i kros korelacionih funkcija, kao i ekvivalentnih i normiranih kros spektara snage paralelnih tragova neravnina kolovoza. Pri analizi rezultata ukazano je na mogući izbor karakterističnih parametara za ocenu kvaliteta kolovoza i time intenziteta pobude vozila.

Ključne reči: neravnine puta, softver, korelacione funkcije, funkcija koherence, spektri