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ETERMINING THE RANK OF INFLUENCE OF CERTAIN PARAMETERS ON THE OSCILLATORY VEHICLE MOTION BY THE APPLICATION OF SENSITIVITY THEORY ON A THREE-DIMENSIONAL VEHICLE MODEL

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In this paper we demonstrate the procedure of determining the influence of certain parameters on vehicle vibrations. We consider the three-dimensional linear vehicle model with seven degrees of freedom with the following parameters: stiffness and damping of the four tires, wheel mass, suspended mass and its moments of inertia, and the stiffness and damping coefficients of the suspension system. We analyze the response of the system to various initial conditions. First order logarithmic sensitivity functions are defined and based on them the rank of influence of certain parameters on vehicle vibrations is determined. It will be shown that the suspended mass has the greatest influence on the oscillatory motion of the vehicle, and that ignoring the damping of the tires is justified since this parameter, together with the moment of inertia along the longitudinal axis, has the smallest influence.
Keywords: oscillatory model, sensitivity function, vehicle vibrations

ODREĐIVANJE RANGA UTICAJA POJEDINIH PARAMETARA NA OSCOLATORNO KRETANJE VOZILA PRIMENOM TEORIJE OSETLJIVOSTI NA TRODIMENZIONALNI MODEL VOZILA

U radu se prikazuje postupak određivanja uticaja pojedinih parametara na vibracije vozila. Razmatra se trodimenzionalni (prostorni) linearni model vozila sa sedam stepeni slobode čiji su parametri: krutosti i prigušenja četiri pneumatika, mase točkova, oslonjena masa i njeni momenti inercije i krutosti i prigušenja sistema oslanjanja. Analiziraju je odzivi sistema na pobudu tipa početnih uslova. Definisane su logaritamske funkcije osetljivosti prvog reda i na osnovu njih je određen rang uticaja pojedinih parametara na vibracije vozila. Pokazuje se da oslonjena masa ima najveći uticaj na oscilatorno kretanje vozila, kao i da je opravdano zanemarivanje prigušenja pneumatika kod većine autora, jer ovaj parametar, uz moment inercije oko uzdužne ose, zaista ima najmanji uticaj.
Ključne reči: oscilatorni model, funkcije osetljivosti, vibracije vozila