[1] THE DYNAMIC ANALYSIS OF A VEHICLE'S MOTION AT THE POINT OF CORNERING

Dragomir Lalović, *Zastava Vehicles Group, R&D Department, Trg Topolivaca 4, Kragujevac, Serbia*
Aleksandra Janković, *Faculty of Mechanical Engineering, Kragujevac, Serbia*
Rade Đukić, *High Technical School, Kragujevac, Serbia*
Đorđe Antonijević, *Faculty of Mechanical Engineering, Kragujevac, Serbia*

UDC: 629.113.3:[531.38:531.232

Abstract

The dynamics of a vehicle's circular motion is being elaborated throughout the work itself, complete with the analysis of all relevant parameters necessary for monitoring vehicles' stability and steering systems.

What has been examined is the spatial model of vehicles displaying characteristics inherent in the sprung mass (such as mass, the moment of inertia and the position of the center of gravity), complete with the characteristics regarding a vehicle wheelbase, a lateral characteristic of a pneumatic tyre and the influence of a steering system (steering gear ratio and the tyre slip angles).

What is obtained as a result of this, is a lateral and longitudinal displacement, complete with a rotation and the velocity of the sprung mass rotation about the vertical axis, and then, the velocity and a direction of the sprung mass velocity, the slip angles of all tyres and the instantaneous center of rotation.

On the basis of these parameters, it is possible to determine vehicles' stability and steering systems under the given motion condition.

The work itself is provided with an elaborated example of a circular vehicle motion substantiated with the input values of a single home made vehicle and the results of all relevant parameters.

Key words: vehicle dynamics, circular motion.

[1] Received: August 2009
Accepted: November 2009

Primljen: Avgust 2009.god
Prihvaćen: Novembar 2009

DINAMIČKA ANALIZA KRETANJA VOZILA U KRIVINI

UDC: 629.113.3:[531.38:531.232

Rezime: U radu se obrađuje dinamika kružnog kretanja vozila sa analizom svih relevantnih parametara za praćenje stabilnosti i upravljivosti vozila.

Posmatran je ravanski model vozila sa karakteristikama oslonjene mase (masom, momentom inercije i polžajem težišta), osovinskim rastojanjem, bočnom karakteristikom pneumatika i uticajem sistema upravljanja (prenosni odnos upravljanja i uglovima zaokretanja točkova).

Kao rezultat imamo poprečno i podužno pomeranje i rotaciju i brzinu rotacije oslonjene mase oko vertikalne ose kao i brzinu i pravac brzine oslonjene mase, uglove skretanja svih točkova i trenutnog centra rotacije.

Na osnovu ovih parametara moguće je odrediti upravljivos i stabilnos vozila pri datom režimu kretanja.

U radu je urađen primer kružnog kretanja vozila sa ulaznim veličinima i rezultatima svih relevantnih parametara.

Ključne reči: Dinamika vozila, kružno kretanje.