
Selection method of tracked vehicle damping characteristics

© A.A. Tsipilev, A.B. Vasiliev, D.G. Kibizov

Bauman Moscow State Technical University, Moscow, 105005, Russia

At present, due to the increase in the caterpillar machines power-to-weight ratio, when the technologies for manufacturing highly-engineered engines are known and widely used, the machine average speed following the traction capabilities limitations has increased significantly. Therefore, the motion regime along periodic irregularities is possible, with the caterpillar being completely detached from the supporting surface. This motion type leads to constant incidence of the car from a certain height and frequent suspension breakdown, since the suspension system (SP) is selected according to other criteria. The article considers a method for selecting a damping characteristic that provides the maximum energy capacity while providing a given acceleration level in the driver place. The article shows simulation results, and confirms that the powerful forward damping introduction allows us to suppress the oscillations.

Keywords: caterpillar machines, torsion suspension, pneumohydraulic suspension, suspension system, smooth running, damping

REFERENCES

- [1] Maretsky P.K. *Vestnik bronetankovoy tekhniki — Bulletin of Armored Vehicles*, 1988, no. 9, pp. 48–51.
 - [2] Nosov N.A., Gladyshev V.D., Volkov Yu.P., Kharchenko A.P. *Raschet i konstruirovaniye gusenichnykh mashin* [Calculation and design of caterpillar machines]. Leningrad, Mashinostroenie Publ., 1972, 560 p.
 - [3] Kotiev G.O., Sarach E.B., Sukhorukov A.V. *Izvestiya vysshikh uchebnykh zavedeny. Mashinostroenie — Proceedings of Higher Educational Institutions. Machine Building*, 2002, no. 7, pp. 40–45.
 - [4] *An Extreme Personal Tank Comes on the Market the RipsawEV2*. Available at: <http://tek-think.com/2015/05/30/an-extreme-personal-tank-comes-on-the-market-the-ripsaw-ev2/> (accessed February 14, 2017).
 - [5] Sarach E.B. *Metod vybora kharakteristik sistem podressorivaniya s netselym chislom stepeney svobody dlya bystrokhodnoy gusenichnoy mashiny*. Dis. ... kand. tekhn. nauk [Method for choosing characteristics of a suspension system with a non-integer number of degrees of freedom for a high-speed tracked machine. Cand. Sc. (Eng.) Diss.]. Moscow, 2003, 150 p.
 - [6] Kotiev G.O., Sarach E.B., Smirnov I.A. *Inzhenernyy zhurnal: nauka i innovatsii — Engineering Journal: Science and Innovation*, 2013, iss. 10 (22). DOI: 10.18698/2308-6033-2013-10-976
 - [7] Dmitriev A.A., Chobitok V.A., Telminov A.V. *Teoriya i raschet nelineynykh sistem podressorivaniya gusenichnykh mashin* [Theory and calculation of nonlinear systems of suspension of caterpillar machines]. Moscow, Mashinostroenie Publ., 1976, 207 p.
 - [8] Kotiev G.O. *Prognozirovanie ekspluatatsionnykh svoystv sistem podressorivaniya voennykh gusenichnykh mashin*. Dis. ... dokt. tekhn. nauk [Forecasting the performance properties of suspension systems for military caterpillar vehicles. Diss. Dr. Sc. (Eng.)]. Moscow, BMSTU Publ., 2000, 265 p.
-

-
- [9] Avramov V.P., Kaleychev N.B. *Dinamika gusenichnoy mashiny pri ustanovivshemsyadvizhenii po nerovnostyam* [Dynamics of the caterpillar with steady motion along irregularities]. Kharkov, Vysscha shkola Publ., 1989, 112 p.

Tsipilev A.A. (b. 1987) graduated from Bauman Moscow State Technical University in 1984. Assistant Lecturer of the Department of Multipurpose Caterpillar Machines and Mobile Robots, Bauman Moscow State Technical University. Research interests: suspension systems of transport vehicles; mathematical modeling of pneumohydraulic suspension systems. e-mail: alextx@bmsu.ru

Vasiliev A.B., a student of the Department of Multipurpose Caterpillar Machines and Mobile Robots, Bauman Moscow State Technical University.

Kibizov D.G., a student of the Department of Multipurpose Caterpillar Machines and Mobile Robots, Bauman Moscow State Technical University.
