
Thermal load evaluation of the tracked vehicle suspension system

© E.B. Sarach, A.A. Tsipilev, O.A. Nakaznoy

Bauman Moscow State Technical University, Moscow, 105005, Russia

Thermal load problems of vehicle suspension systems are of particular importance in studying the machine movement dynamics and its smooth running. High thermal load of pneumatic-hydraulic devices results in the suspension system failure risk due to destruction or a quick seal wear. For a more accurate thermal stress assessment it is necessary to use mathematical modeling simulation. The article presents the field trials results of intermediate weight category tracked vehicle and engine traffic simulation for the same harmonic irregularities. The article shows the mathematical model high value, gives recommendations to reduce the suspension system thermal load of the tracked vehicle under study.

Keywords: *transport machines, pneumatic-suspension, suspension system, experiment, smooth, heat load, finite difference method of Schmidt, Simulink, Simscape, SimHydraulics.*

REFERENCES

- [1] Smirnov A.A. *Matematicheskoe modelirovanie pnevmogidravlicheskikh ustroystv sistem podressorivaniya transportnykh sredstv. Diss. cand. tekhn. nauk* [Mathematical modeling pneumatic/hydraulic devices of vehicle cushioning systems. Cand. Eng. Sci. Diss.]. Moscow, 1999, 179 p.
 - [2] Zhileykin M.M., Kotiev G.O., Sarach E.B. *Nauka i obrazovanie — Science and Education*, 2011, no. 12. Available at: <http://technomag.bmstu.ru/doc/346642.html>
 - [3] Kotiev G.O., Smirnov A.A., Shilkin V.P. *Issledovanie rabochikh protsessov v pnevmogidravlicheskikh sistemakh podressorivaniya gusenichnykh mashin* [Research of working processes in pneumatic/hydraulic cushioning systems of tracked vehicles]. Moscow, BMSTU Publ., 2001, 80 p.
 - [4] Sukhorukov A.V. *Upravlenie dempfiruyushchimi elementami v sisteme podressorivaniya bystrokhodnoy gusenichnoy mashiny. Diss. cand. tekhn. nauk* [Damping element control in the cushioning system of high-speed tracked vehicle. Cand. Eng. Sci. Diss.]. Moscow, 2003, 149 p.
 - [5] Furunzhiev R.I., Ostanin A.N. *Upravlenie kolebaniyami mnogoopornykh mashin* [Vibration control in multiple-seated machines]. Moscow, Mashinostroenie Publ., 1984, 206 p.
 - [6] Pozdeev A.V., Novikov V.V., Dyakov A.S., Pokhlebin A.V., Ryabov I.M., Chernyshov K.V. *Reguliruemye pnevmaticheskie i pnevmogidravlicheskie resory podvesok avtotransportnykh sredstv* [Adjustable pneumatic and hydro-pneumatic springs of vehicle suspensions]. Volgograd, Volgograd State technical University Publ., 2013, 244 p.
 - [7] Kotiev G.O. *Prognozirovanie ekspluatatsionnykh svoystv sistem podressorivaniya voennykh gusenichnykh mashin. Diss. dokt. tekhn. nauk* [Prediction of operational properties of military tracked vehicle cushioning systems. Dr. Eng. Sci. Diss.]. Moscow, BMSTU Publ., 2000, 265 p.
 - [8] Kotiev G.O., Sarach E.B. *Kompleksnoe podressorivanie vysokopodvizhnykh dvukhzvennykh gusenichnykh mashin* [Integrated cushioning of highly mobile articulated tracked vehicle]. Moscow, BMSTU Publ., 2010, 184 p.
-

-
- [9] Tsipilev A.A. *Issledovanie teplonagruzhennosti pnevmogidravlicheskikh ustroystv system podressorivaniya bystrokhodnykh transportnykh mashin* [The research of heat load of cushioning system pneumatic/hydraulic devices of high-speed vehicles]. *Trudy NAMI* [Proceedings of NAMI]. Moscow, 2015, no. 261, pp. 151–172.
- [10] *Sovremennyye tendentsii razvitiya nauki i tekhnologiy* [Modern trends in the development of science and technology]. *Sbornik dokladov XV Mezhdunarodnoy nauchno-prakticheskoy konferentsii* [Coll. rep. of the XV International Scientific and Practical Conference]. Belgorod, June 30, 2016, 151 p.

Sarach E.B. (b. 1975) graduated from Bauman Moscow State Technical University in 1999. Dr. Sci. (Eng.), Professor, Head of the Department of Multi-Purpose Tracked Vehicles and Mobile Robots, Bauman Moscow State Technical University. Author of over 50 publications in the field of transport mechanical engineering.

Tsipilev A.A. (b. 1961) graduated from Bauman Moscow State Technical University in 2009. Assistant of the Department of Multi-Purpose Tracked Vehicles and Mobile Robots, Bauman Moscow State Technical University. Research interests include transport machine suspension system; pneumatic hydraulic suspension systems mathematical modeling.

Nakaznoy O.A. (b. 1964), Dr. Sci. (Eng.), Professor, Head of the Department of Multi-Purpose Tracked Vehicles and Mobile Robots, Bauman Moscow State Technical University. Author of over 70 publications in the field of theory of multi-purpose tracked vehicles motion.
