INVESTIGATION OF THE NATURAL FREQUENCIES AND THE MODE SHAPES OF CIRCULAR SAW WITH COMPENSATING SLOTS BY THE FINITE ELEMENT METHOD

Georgi Vukov, Zhivko Gochev, Valentin Slavov

ABSTRACT

This paper shows the methodics and results of the simulative investigation of the circular saw with compensating slots. The investigation is an extension of the previous one done by the authors. The natural frequencies and mode shapes of this kind of circular saws are obtained as results of the investigations. The estimation is done by application programme Cosmos Works. Physical and mechanical properties of the materials are taken into account. The adequate mechanic-mathematical model is used for the aims of the study.

The typical characteristics of the structure of this kind of circular saws were taken into account in the model. The circular saw is drawn in 3D by the application programme Solid Works and it is modeled with four nodes 3D finite elements. The results of this investigation prove the practical significance of the model. They point the possibilities for determinations of resonant regimes and they are basis for their detailed studying.

REFERENCES

Angelov, I. V. (2010): Matrix mechanics - Dynamics, Avangard Prima, Sofia.

Angelov, I. V., Slavov, V. R. (2010): Book of problems. Matrix mechanics - Dynamics, Avangard Prima, Sofia.

Veits V. L., Kochura A. E., Martinenko A.M. (1971): Dynamical investigation of drive machines - Moscow.

Vukov, G. Y., Zh. Gochev, V. Slavov (2010): Torsional Vibrations in the Saw Unit of a Kind of Circular Saws. Mechanical-Mathematical Model. Proceedings Scientific Papers, Third Scientific and Technical Conference “Innovation in Forest Industry and Engineering Design”, Sofia, pp. 185-188.

Vukov, G. Y., D. Georgieva (2009): Application of Monitoring Systems and Diagnostics for Increase of Effectiveness, Economy and Reliability of the Equipment in the Woodworking and Furniture Production. Management & Sustainable Development № 1, y. 11, V 22, University of Forestry, Sofia, pp. 196-201.

Minchev N., Grigorov V. (1998): Vibration control of rotation and piston machines. Sofia.

Obreshkov P. (1996): Woodworking machines. Sofia.

Philipov G. (1977): Woodworking machines. Sofia.

Amirouche F. (2006): Fundamentals of Multibody Dynamics – Theory and Applications, Birkhäuser, Boston.

Coutinho M. (2001): Dynamic Simulations of Multibody Systems, Springer-Verlag, New-York. www.solidworks.com.