"8th International Conference moNGeometrija, focused on the research about geometry, graphics and application to science, engineering and art"

Belgrade, 10.-12. September, 2021.

Synthesis Of Mechanisms For Linear Motion Using Modern Methods

Aleksandra M. Stakić^{1*}, Boris B. Kosić², Zorana V. Jeli²

^{1*} University of Kragujevac, Faculty of Technical Sciences, Department of Mechatronics, 32102 Čačak, Serbia
² University of Belgrade, Faculty of Mechanical Engineering, Theory of machines and mechanisms, 11000 Belgrade, Serbia

aleksandra.stakic@ftn.kg.ac.rs, bkosic@mas.bg.ac.rs, zjeli@mas.bg.ac.rs

ABSTRACT.

The paper presents a synthesis of mechanisms needed to realize an approximate rectilinear motion. The synthesis was performed at several different levels, by changing different geometric parameters of the mechanism itself. The software package SolidWorks2020 was used for the analysis and synthesis of mechanisms. The main goal of using this method was to provide us a possible solution to turn the classic type of mechanism into the compliant mechanism. Four different mechanisms were used for specific examples, but the idea was to form a methodology for converting classical mechanisms into compliant mechanisms.

Keywords. synthesis of mechanisms, compliant mechanisms, 3D modelling

REFERENCES

- 1. A. Pandiyan, Arun Kumar: Design methods for compliant mechanisms used in new age industries,
- 2. A. Milojević, N. Pavlović, Software for synthesis of compliant mechanisms without intersecting elements, Mechanical Engineering Vol. 11, N o 2, 2013, pp. 153 168,
- 3. Larry L. Howell: Compliant mechanisms, 2001,
- 4. K. Marković, Analysis of influencing parameters in the design of cross-spring pivots, doctoral thesis, University of Rijeka Faculty of engineering, 2015,
- 5. L. Zentner, S. Linß, Compliant Systems-Mechanics of Elastically Deformable Mechanisms, Actuators and Sensors. München: De Gruyter Oldenbourg; 2019,
- 6. Y. Tiana,b, B. Shirinzadeha, D. Zhang b, Y. Zhong, Three flexure hinges for compliant mechanism designs based on dimensionless graph analysis, Precision Engineering 34 (2010) 92–100,
- 7. S. Linß, S. Henning, L. Zentner, Modeling and Design of Flexure Hinge-Based Compliant Mechanisms, Open access peer-reviewed chapter, 2019,
- 8. A. Hall, The Pseudo-Rigid-Body Model for Fast, Accurate, Non-Linear Elasticity, Brigham Young University Provo, 2013,
- 9. J. Gallego, J. Herder: Synthesis method in compliant mechanism: an overview, Proceedings of the ASME 2009 International Design Engineering Technical Conferences & Computers and Information in Engineering Conference, 2009, San Diego, California, USA,



"8th International Conference moNGeometrija, focused on the research about geometry, graphics and application to science, engineering and art"

Belgrade, 10.-12. September, 2021.

- 10. X. Zhang, B. Zhu, Topology Optimization of Compliant Mechanisms, Springer, 2018,
- 11. B. Zhu, X. Zhang, H. Zhang, J. Liang, H. Zang, H. Li, R. Wang, Design of compliant mechanisms using continuum topology optimization: A review, Mechanism and Machine Theory, 2020,
- 12. P. Xu, Y. Jingjun, Z. Guanghua, B. Shusheng, Design of Compliant Straight-line Mechanisms Using Flexural Joints, Chinese journal of mechanical engineering, Vol. 27, No. 1, 2014
- 13. K. Chang, Motion Simulation and Mechanism Design with SolidWorks Motion, 2021,
- 14. S. Savković, M. Šekarić, V. Vujičić, A. Petrović, P. Marić, I. Milićević, Modeling and simulation of shaping machine tool coulisse mechanism via matlab and solidworks software, Technics and informatics in education, 5th International Conference, Faculty of Technical Sciences Čačak, 2014.