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Contact interaction of two-layer axially symmetric shells taking into account both geometric nonlinearity and contact interaction

Jan Awrejcewicz, Vadim A. Krysko - jr., Irina V. Papkova

Abstract: In this paper a mathematical model of the nonlinear dynamics of flexible two-layer axially symmetric spherical shells of the same curvature is proposed. The geometric nonlinearity is taken into account by the von Kármán model. The shell material is isotropic and homogeneous. For each layer the Kirchhoff-Love hypothesis is applied. The contact interaction between the shells is taken into account according to the Kantor model. The mathematic models include an infinite number of degrees-of-freedom. The method of finite differences of the second accuracy order and the Runge-Kutta type methods are employed. The convergence of methods depending on the integration step regarding spatial coordinates is investigated and the reliability of the results is studied. The largest Lyapunov exponent is determined by the methods of Wolf, Kantz and Rosenstein. The influence of the magnitude of the amplitude gap and the frequency of the driving load on the contact interaction as well as phase synchronization are analyzed. Acknowledgements This work has been supported by the grants the Russian Science Foundation, RSF 16-19-10290

[1)] Jan Awrejcewicz, Professor: Lodz University of Technology, Faculty of Mechanical Engineering, Department of Automation, Biomechanics and Mechatronics, 1/15 Stefanowskego Str., 90-924 Lodz, POLAND (jan.awrejcewicz@p.lodz.pl), the author presented this contribution at the conference.

[2)] Vadim A. Krysko - jr., M.Sc. (Ph.D. student): Department of Mathematics and Modeling, Saratov State Technical University, Politehnicheskaya 77, 410054 Saratov, RUSSIAN FEDERATION (vadimakrysko@gmail.com).

[3)] Irina V. Papkova, Assistant Professor: Department of Applied Mathematics and Systems Analysis, Saratov State Technical University, Politehnicheskaya 77, 410054 Saratov, RUSSIAN FEDERATION (ikravzova@mail.ru).