

## Deterministic chaos in a damage dynamics of the engineering (vibrating) structures under varying environmental and operational conditions

**Alexander V. Glushkov, Vasily V. Buyadzhi, Alexander Mashkantsev,  
Alexey Lavrenko**

*Abstract:* The work is devoted to problem of analysis, identification and prediction of the presence of damages, which above a certain level may present a serious threat to the engineering (vibrating) structures etc in result of the operational, environmental conditions, including the emergency accidents. We present and apply a novel computational approach to modelling, analysis of a chaotic behaviour of structural dynamic properties of the engineering structures, based on earlier developed chaos-geometric and vibration blind source monitoring approach. It includes a combined group of methods such as correlation integral approach, average mutual information, surrogate data, the Lyapunov's exponents and Kolmogorov entropy analysis, nonlinear prediction models etc (in versions [1-3]). We present the results of analysis and modelling chaotic elements in dynamical parameter time series for the experimental cantilever beam [3]. We list the data on the topological and dynamical invariants, namely, the correlation, embedding, Kaplan-Yorke dimensions, the Lyapunov's exponents and Kolmogorov entropy etc. References 1. Glushkov A.V., Methods of a Chaos Theory. Odessa: Astroprint, 2012. 2. Glushkov A.V., Khetselius O.Yu., Svinarenko A.A., Buyadzhi V.V., Methods of computational mathematics and mathematical physics, P.1. Odessa: TEC, 2015. 3. Tjirkallis A., Kyprianou A. Mech.l Syst. Signal Process. 66-67, 282 (2016).

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- 1) Alexander V. Glushkov, Professor: Department of Applied Mathematics, Odessa State Environmental University, L'vovskaya str., 15, of. 408, Odessa, 65016, Ukraine (UA), glushkovav@gmail.com.
  - 2) Vasily V. Buyadzhi, Associate Professor: Department of Applied Mathematics, Odessa State Environmental University, L'vovskaya str., 15, of. 408, Odessa, 65016, Ukraine (UA), buyadzhivv@gmail.com.
  - 3) Alexander Mashkantsev, M.Sc. (Ph.D. student): Department of Applied Mathematics, Odessa State Environmental University, L'vovskaya str., 15, of. 408, Odessa, 65016, Ukraine (UA), mashkantsevaa@rambler.ru.
  - 4) Alexey Lavrenko, M.Sc. (Ph.D. student): Department of Applied Mathematics, Odessa State Environmental University, L'vovskaya str., 15, of. 408, Odessa, 65016, Ukraine (UA), lavrodesa@rambler.ru.