

INVESTIGATION OF DYNAMIC SYSTEMS' FAMILIES WITH POLYNOMIAL RIGHT PARTS

Andreeva I.A.

Peter the Great St.Petersburg Polytechnic University, irandr@inbox.ru

Dynamic systems in applications are useful as mathematical models of those processes and phenomena, where statistical events, or fluctuations, may be disregarded. Dynamic systems may be divided into the two main classes - the systems with continuous time (the flows), and systems with discrete time (the cascades). During the investigations of, first of all, flows normal autonomous systems of ordinary differential equations are used. The present work is devoted to the original rigorous research of the wide family of dynamic systems having reciprocal polynomial right parts, which are the forms of phase variables of those systems. The whole wide family under consideration is being split into numeric subfamilies belong to different hierarchical levels and is subjected to the first and the second Poincare transformations, or mappings. As a result, the full qualitative pattern of trajectories is constructed - using the Poincare sphere - in the Poincare disk. A series of new special investigation methods was developed, useful for further investigations of similar dynamic systems' classes.

References.

1. Andreeva, Irina, Andreev, Alexey. Investigation of a Family of Cubic Dynamic Systems. // *Vibroengineering Procedia*. Vol. 15.Dec. 2017. Pp. 88-93.
2. Andreeva I.A., Andreev A.F. Phase Portraits of One Family of Cubic Systems in a Poincare Circle. I. // *Vestnic RAEN*. 2017. Vol. 17. № 4. Pp. 8 – 18.
3. Andreeva I.A., Andreev A.F. Phase Portraits of a Family of Cubic Systems in a Poincare Circle. II. // *Vestnic RAEN*. 2018. Vol. 18. № 4. Pp. 11 – 15.
4. Andreev A.F., Andreeva I.A. Phase Portraits of Some Family of Cubic Dynamic Systems in a Poincare Circle. III. // *Vestnic RAEN*. 2019. Vol. 19. № 2. Pp. 20 – 24.
5. Andreev, A.F., Andreeva, I.A. On a Behavior of Trajectories of a Certain Family of Cubic Dynamic Systems in a Poincare Circle. // *IOP Journal of Physics, Conference Series*, 2018, 1141.
6. Andreeva, I.A., Efimova, T.O. Phase Portraits of a Special Class of Dynamic Systems in a Poincare Circle. // *IOP Journal of Physics, Conference Series*, 2019, 1236.
7. Andreeva I.A., Andreev A.F. On One Special Family of Cubic Dynamic Systems. // 26th International conference «Mathematics. Computer. Education», 27.01 – 02.02 2019, Russia, Pushino Center of Russian Academy of Sciences.