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Malyarets L. Topology of Quadratic Systems of Differential Equations with Six Limit Cycles /
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A qualitative analysis of the so-called Andronov's system of two differential equations is carried out. The conditions for the existence of limit cycles around two singular points, which are complex foci, are considered. The previously obtained calculation results, which are generally accepted for describing this system, are based on the maximum possible cyclicity for such special points in a ratio of 3:1. In this study, a non-trivial example of a quadratic system of two differential equations with two control parameters is proposed, for which the existence of six limit cycles in the ratio 3:3 was found. To verify this result, two different methods applied to determining the cyclicity of singular points of the complex focus type were used. This result can be considered as a significant contribution to the solution of Gilbert's sixteenth problem for the case of a quadratic system of differential equations.

Keywords: Gilbert's sixteenth problem, Andronov's system of two differential equations, singular points, complex foci, limit cycle, Poincaré Normal Form, Lyapunov Quantities

complex foci