Applications of Computer Algebra – ACA2018
Santiago de Compostela, June 18–22, 2018

Local and Global Properties of ODEs

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We consider autonomous planar systems of ordinary differential equations with a polynomial nonlinearity. These systems are resolved with respect to derivatives and can contain free parameters. To study local integrability of the system near each stationary points, we use an approach based on Power Geometry[1] and on the computation of the resonant normal form[2, 3]. For the pair of concrete planar systems[4] and[5], we found the complete set of necessary conditions on parameters of the system for which the system is locally integrable near each stationary points. The main idea of this report is in the hypothesis that if for each fixed set of parameters such that all stationary points of the equation are centers then this system has the global first integral of motion. So from some finite set of local properties we can obtain a global property. But if the system has some invariant lines or separatists, this first integral can exist only in the part of the phase space, where center points take place.

Keywords: Local Integrability, Global Integrability

Mathematics Subject Classification 2010: 34L30, 37K10

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*The publication has been prepared with the support of the "RUDN University Program 5-100" and funded by RFBR according to the research projects No. 12-34-56789 and No. 12-34-56789. Valery Romanovski acknowledges the financial support from the Slovenian Research Agency (research core funding No. P1-0306 and project N1-0063).

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