On necessary conditions of integrability of degenerated planar ODE systems in the parameter space

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Abstract

We consider an autonomous system of ordinary differential equations, which is resolved with respect to derivatives. To study local integrability of the system near a degenerate stationary point, we use an approach based on Power Geometry and on the computation of the resonant normal form. For the partial non Hamilton 5-parameter case of concrete planar system, we found the almost complete set of necessary conditions on parameters of the system for which the system is locally integrable near a degenerate stationary point. These sets of parameters, satisfying the conditions, consist of 4 two-parameter subsets in this 5-parameter space except 1 special hyper plane. We wrought down 4 the first integrals of motion as functions in parameters of the system. But we can say nothing about possibility an existence of additional first integrals at the single special values of one of the parameters.