Some integrability properties of the Kahan method

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Abstract

The Kahan method for ordinary differential equations has recently received a renewed attention due to its integrability properties when applied to some classes of integrable quadratic differential equations (see for instance [1,2] and references therein).

In this talk, we consider a family of (super) integrable quadratic ODEs generated by monomial vector fields, that we call Elementary Monomial Vector Fields (EMVFs). The EMVFs possess integrals which are not necessarily quadratic and the vector fields themselves need not be Hamiltonian with respect to the standard symplectic structure. We show that, for certain choices of integer coefficients, the Kahan method is integrable when applied to these EMVFs and we give the form of the modified integrals.

References

[1] M. Petrera, A. Pfadler and Yu. B. Suris. On the integrability of Hirota–Kimura type discretizations. arXiv:1008.1040v2

[2] E. Celledoni, R. I. McLachlan, D. I. McLaren, B. Owren and G. R. W. Quispel. Integrability properties of Kahan's method. *J. Physics A: Mathematical and Theoretical*, 47(36), 2014.

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