Introduction to G-symplectic methods

G-symplectic methods are an alternative to symplectic Runge-Kutta methods [4]. This talk will discuss the development of G-symplectic methods in collaboration with Y. Habib, A. Hill, G. Imran, T. Norton, H. Podhaisky and others. In particular, a sixth order method [3], will be presented, together with numerical experimental results.

To support the analysis of G-symplectic, and other general linear methods, a discussion will be included of trees, forests, elementary differentials and B-series. Recent references on these topics are [1] and [2].

References

1. J. C. Butcher, Numerical Methods for Ordinary Differential Equations, Wiley (2016)

2. J. C. Butcher, B-series: Algebraic Analysis of Numerical Methods, Springer-Verlag (2021)

3. J. C. Butcher, G. Imran and H. Podhaisky, A G-symplectic method of order 6, BIT **57**, 313–328 (2017)

4. J. M. Sanz-Serna, Runge–Kutta schemes for Hamiltonian systems, BIT **39**, 877–883 (1988)