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Effective order methods for separable differential equations

The idea of effective order was pioneered by J. C. Butcher to construct Runge-Kutta methods of order five with just five stages. For separable differential equations such as separable Hamiltonian systems, one can solve some components of its unknown dependent variable by one Runge-Kutta method and solve the remaining components with another Runge-Kutta method. The scheme is termed as Partitioned Runge-Kutta (PRK) methods. We have extended the idea of effective order to construct efficient symplectic PRK methods for separable differential equations which can preserve some of the underlying geometric properties as well.