

A review on exponentially fitted Runge-Kutta methods

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Abstract

This talk deals with the numerical solution of IVPs for ODE systems

$$y'(t) = f(t, y(t)), \quad y(t_0) = y_0 \in \mathbb{R}^N, t \in [t_0, T], \quad (1)$$

with oscillating or periodic solutions by means of "exponentially fitted Runge-Kutta" (EFRK) schemes. This class of methods gives good results when the frequency ω is approximately known in advance.

We present a review of the EFRK methods for the numerical integration of (1). The first part of this talk is devoted to the analysis of explicit EFRK methods, the study of the order and the construction of embedded pairs of EFRK schemes.

The second part is concerned with the construction of high-order implicit EFRK methods, in particular the exponentially fitted Gauss methods.