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An order 19-rational integrator

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Abstract

In this research paper, an order 19-rational integrator was developed for solving stiff initial-value problems of differential equations of the form:

$$y' = f(x, y); y(x_0) = y_0$$

The consistency and convergence of this method were established following the steps of Lambert J.D [?], where he stated that a one-step numerical integrator of the form

$$y_{n+1} = y_n + h_n \phi(x_n, y_n, h_n)$$

is convergent if and only if it is consistent.

The application of this method to some selected stiff problems showed that it compared favourably with existing methods in terms of efficiency and accuracy.

Key words: initial value problems, rational integrator, consistency, convergence, stiff problems.