

Analysis of Low Storage Explicit Runge-Kutta Methods

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Resumen.

In this talk, we examine explicit Runge-Kutta (RK) methods for solving high-dimensional systems of ordinary differential equations (ODEs), which can be implemented using only two memory registers. We refer to these schemes as low-storage explicit Runge-Kutta methods.

To this end, we analyze fourth-order, four-stage explicit low-storage schemes of the van der Houwen, Williamson, Ketcheson, and Calvo type, which can be carried out with just two memory registers per step. In addition, we consider fifth-order, five-stage methods for the numerical solution of linear inhomogeneous ODEs.

We then construct optimal schemes that provide a suitable balance between accuracy and stability. Their performance is assessed by solving several high-dimensional differential systems.

Finally, numerical experiments highlight the competitiveness of the proposed methods when compared with classical Runge-Kutta schemes.

Palabras clave: Low-storage; Runge-Kutta methods; Time advancing methods

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