

On randomized implicit Runge–Kutta methods

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Randomized Runge–Kutta methods have been used for the numerical solution of ordinary differential equations with time–irregular coefficient functions, cf. [2, 1]. In the present work we construct a diagonally implicit, A–stable, two-stage scheme which is based on a randomized trapezoidal quadrature. The method has classical order 2. Numerical experiments with a variable step-size implementation illustrate the convergence properties for a few non-smooth problems.

References

- [1] Tomasz Bochacik, Maciej Goćwin, Paweł M. Morkisz, and Paweł Przybyłowicz. Randomized Runge-Kutta method—stability and convergence under inexact information. *J. Complexity*, 65:101554, 21, 2021.
- [2] Raphael Kruse and Yue Wu. Error analysis of randomized Runge-Kutta methods for differential equations with time-irregular coefficients. *Comput. Methods Appl. Math.*, 17(3):479–498, 2017.