A COMPARISON OF MATLAB CODES FOR SOLVING FRACTIONAL DIFFERENTIAL EQUATIONS OF CAPUTO TYPE

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Fractional differential equations have, over the previous decades, attracted more and more attention from the mathematical community, due to both their interesting analytical properties and widespread applicability in scientific modeling. While there are multiple, typically non-equivalent definitions of fractional derivatives in use, equations with Caputo-type fractional operators are perhaps most often used, since they allow, among other things, the use of "more natural" initial conditions for problems of fractional order greater than one. As a result, many competing numerical methods have been devised and investigated for approximating their solution; for some such methods, their Matlab codes have also been made available. The aim of the present contribution is to is to highlight a systematic comparison of some of such codes on a selected set of test problems, published in [1], and to introduce the FDE-testset environment available on the website https://people.dimai.unifi.it/brugnano/FDEtestset.

References

[1] L. Brugnano, G. Gurioli, F. Iavernaro, M. Vikerpuur, *FDE-testset: comparing Matlab codes for solving fractional differential equations of Caputo type*, Fractal Fract., 9 (2025), 312.