Stability of multi-parameter exponentially fitted methods for differential equations

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Abstract

We will look into the structure of the stability functions of multi-parameter exponentially fitted methods for differential equations. Our starting point is de results in [1], which considered the construction of P-stable symmetric Obrechkoff methods for second differential equations. We re-examine this topic and extend the approach to P-stable multi-parameter exponentially fitted Obrechkoff methods. Due to the common structure of these stability functions, this result can very easily be reused for multi-parameter EF Runge-Kutta methods. We will look into the resulting EF stability regions and associated order stars.

References

[1] M. Van Daele and G. Vanden Berghe. P-stable exponentially-fitted obrechkoff methods of arbitrary order for second-order differential equations. *Numerical Algorithms*, 46:333–350, December 2007.