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## GTPSA.jl: A SciBmad interface to the Generalised Truncated Power Series Algebra library

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A full-featured interface package to the Generalised Truncated Power Series Algebra (GTPSA) library in MAD-NG has been implemented in the Julia programming language. GTPSA performs fast Taylor-mode automatic differentiation (AD) of functions to arbitrary orders in the specified variables and parameters. In particular, GTPSA excels at computing derivatives to high orders ( $>1$ ) and high numbers of variables/parameters, making it an extremely powerful tool for use in optimization and in computing parametric Taylor maps. This Julia interface offers another simple way of using the GTPSA library, and will be used extensively in the SciBmad accelerator physics software ecosystem. In this paper, we showcase features implemented in the interface package, and present benchmarks of GTPSA.jl against other commonly-used Julia AD packages.

### Footnotes

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