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Magn. Reson. Discuss., referee comment RC2
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Comment on mr-2021-4

Anonymous Referee #2

Referee comment on "Approximate representations of shaped pulses using the homotopy analysis method" by Timothy Crawley and Arthur G. Palmer III, Magn. Reson. Discuss., https://doi.org/10.5194/mr-2021-4-RC2, 2021

This manuscript intorduces homotopy analysis on Riccati equation and derives Euler angles for certain shaped pulses. The
derivations, simulations, and explanations are all nicely done. The proposed semi-analytical solutions are faster
to analyse than numerical simulations. Some comments:

*The basis sets for the matrix representations should be given.
*Some of the equations, like Eq. (24), are not obvious, pointers at derivation may be given.
*It is written that HAM works well with an appropriate choice of a linear operator and stating functions. Are these
given in the manuscript for the examples illustrated? How easy is to fix these for an arbitrary pulse? What are the
guiding parameters in this regard?
*Any comments on the quaternions and Euler angles calculation for the pulse methods illustrated here?
*When the authors say that the HAM-Riccati approach may work well for other cases in NMR, what do they have in mind?
*In the current manuscript, although elegant examples are given, I am not sure how the approach can be used to
make the schemes better. Perhaps this can be explained in the text.
*On a semantic level, I am not sure what is actually meant by theoretical magnetic resonance. It is essentially an
experimental field with solid inputs from theory. We may not want to just keep calculating some parameters from
sophisticated equations which may have no practical relevance.