

Magn. Reson. Discuss., community comment CC4  
<https://doi.org/10.5194/mr-2021-65-CC4>, 2022  
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## Reply on AC1

Tom Barbara

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Community comment on "Radiation damping strongly perturbs remote resonances in the presence of homonuclear mixing" by Philippe Pelupessy, Magn. Reson. Discuss., <https://doi.org/10.5194/mr-2021-65-CC4>, 2022

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I checked out the consequences of the extra terms proportional to  $\cos(\psi)$  and  $\sin(\psi)$  to the stereographic projection method and to my surprise it gives a term in  $iMz\zeta$  where  $\zeta$  is the complex Riccati variable. This is quite ugly and spoils the entire program of making the transformation. Another surprise! I am not aware of anyone pointing this out before. So these linearization schemes are very limited in practice.

I really should not have been surprised, because after I worked out the stereographic projection I tried to apply this to inhomogeneous broadened lines. It was definitely not worth the effort and so I gave up on it and used Runge-Kutta on an assembly of 10 spins. Never published that, or the case when saturating a line. The steady state equation is a cubic, and I searched for the case where one would get three real roots and see if one got chaotic behavior. I saw some strange things, but it also just seemed to be a special case that would never be realized in an experiment.