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Soft-pulse refocusing in the presence of Markovian dephasing
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effect of Markovian decoherence on the performance of refocusing sequences. This
is relevant if dynamical decoupling is to be concatenated with quantum error cor-
recting codes as the first stage of decoherence protection. The basic effect is that
an asymmetric decoherence can cause a change in the direction of polarization of
a quantum system. For example, dephasing of a single qubit reduces transverse
components of the spin polarization vector, thus shifting it towards the \( z \) axis. In
this work we construct perturbation expansions of effective decoherence operators
for generic shaped pulses, and for several sequences of \( \pi \)- and \( \pi/2 \)-pulses. While in
general the performance of soft pulses is worse than that of the ideal \( \delta \)-pulses, the
detrimental effect of dephasing can be reduced by pulse shaping.

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