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Robustness of composite pulse sequences to time- dependent noise CHINGIZ KABYTAYEV, Georgia Institute of Technology, TODD J. GREEN, The University of Sydney, KAVEH KHODJASTEH, LORENZA VIOLA, Dartmouth College, MICHAEL J. BIERCUK, The University of Sydney, KENNETH R. BROWN, Georgia Institute of Technology — Quantum control protocols can minimize the effect of noise sources that reduce the quality of quantum operations. Originally developed for NMR, composite pulse sequences correct for unknown static control errors [1]. We study these compensating pulses in the general case of time-varying Gaussian control noise using a filter-function approach [2] and detailed numerics. Three different noise models were considered in this work: amplitude noise, detuning noise and simultaneous presence of both noises. Pulse sequences are shown to be robust to noise up to frequencies as high as ∼10% of the Rabi frequency. Robustness of pulses designed for amplitude noise is explained using a geometric picture that naturally follows from filter function. We also discuss future directions including new pulses correcting for noise of certain frequency.

[1]True J. Merrill and Kenneth R. Brown. arXiv:1203.6392v1. In press Adv. Chem. Phys. (2013)
[2]T. J. Green et al. New J. Phys. 15 095004 (2013)

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