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Suppression of decoherence of a Spin-Boson system by time-periodic control

We consider a finite-dimensional quantum system coupled to a bosonic radiation field and subject to a time-periodic control operator. Assuming the validity of a certain dynamic decoupling condition we study the system's time evolution with regard to the non-interacting dynamics. For sufficiently small coupling constants g and control periods T we show that a certain deviation between coupled and uncoupled propagator as a measure for quantum decoherence may be estimated by $\mathcal{O}(gt\,T)$. Our approach relies on the notion of Kato stability and general theory of non-autonomous linear evolution equations.