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Nested Uhrig Dynamical Decoupling with Non-uniform Error Suppression GREGORY QUIROZ, DANIEL LIDAR, University of Southern California — Here the performance of Nested Uhrig Dynamical Decoupling (NUDD) for qubit systems is analyzed when error suppression is non-uniform. The error suppression provided by NUDD is controlled by the sequence order of each nested sequence. The properties of the error suppression are characterized with respect to varying sequence order to verify the expected error suppression scaling of UDD, order $N + 1$ error suppression with respect to the total time of evolution for an N th order sequence. The system operators present in the system-environment evolution are isolated and used to quantify the order of error suppression associated with each system error operator. Using this as a measurement, error suppression is examined with respect to the strength of system-environment interaction, as well as the pure bath strength. In the case of single-qubit NUDD, known as Quadratic Dynamical Decoupling (QDD), the results show that the error suppression provided by the inner sequence scales exactly with that of UDD, while the outer sequence dynamics leads to error suppression greater than or equal to that expected from UDD. These results can be extended to multi-qubit systems where the error suppression scaling for the inner sequence applied to each qubit follows that of UDD and the outer sequence applied to each qubit gives an error suppression greater than or equal to $N + 1$.

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