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Progress in analytical investigations of the achievement of fault tolerance in quantum computing[1] GERALD GILBERT, YAAKOV WEINSTEIN, MITRE Quantum Information Science Group — We describe progress made in understanding and assuring fault tolerance in quantum computation. We introduce and explore analytical techniques for explicitly determining the logical state of a quantum computer undergoing dynamical evolution according to an arbitrary quantum algorithm. We carry out detailed analyses of the effects of errors, paying special attention to the general case of non-equiprobable errors, i.e., the important and realistic situation in which the probabilities for sigma_x, sigma_y and sigma_z errors are not necessarily the same (sigma_x, sigma_y and sigma_z are the Pauli operators).

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Gerald Gilbert
MITRE Quantum Information Science Group

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