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Qiuju Diao, Qin Huang and Shu Lin* (shulin@ece.ucdavis.edu), Dept of Electrical and Computer Engineering, University of California, Davis, One Shields Ave, Davis, CA 95616, and **Khaled Abdel-Ghaffar**. *A transform approach for construction and analysis of quasi-cyclic low-density parity-check codes.*

A matrix-theoretic approach for studying quasi-cyclic codes based on matrix transformations via Fourier transforms and row and column permutations is developed. These transformations put a parity-check matrix in the form of an array of circulant matrices into a diagonal array of matrices of the same size over an extension field. The approach is amicable to the analysis and construction of quasi cyclic low-density parity-check codes since it takes into account the specific parity-check matrix used for decoding with iterative message-passing algorithms. Based on this approach, the dimension of the codes and parity-check matrices for the dual codes can be determined. Several algebraic and geometric constructions of quasi-cyclic codes are presented as applications along with simulation results showing their performance over AWGN channels decoded with iterative message-passing algorithms. (Received November 30, 2011)