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LDPC codes based on trade designs

Low-Density Parity-Check (LDPC) codes are a practically important class of linear codes. We provide a novel approach to construct the parity-check matrix of an LDPC code with girth at least 6 using trades of directed designs. Then we use those trade-based matrices to construct a base matrix of a multiple-edge quasi-cyclic LDPC code with improved cycle detection and reduced computational complexity. We also use trade-based matrices to construct the parity-check matrix of time-varying spatially-coupled LDPC codes. These techniques are structural and applicable to any directed design. Joint work with Farzane Amirzade and Mohammad Sadeghi.