

Title: On Constructions of Low-density Parity-check Codes with Large Girth

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Abstract

In this talk, I will first discuss two algebraic constructions of low-density parity-check (LDPC) codes, Margulis codes and Ramanujan-Margulis codes. By a random search method, we can obtain Margulis codes with large girth. I will describe a method to construct irregular LDPC codes based on these two algebraically constructed codes. They have better performance than randomly constructed codes and also outperform the PEG codes in low SNR region. Secondly, I will talk about employing a generalized Kronecker product recursively to construct LDPC codes with an arbitrary large girth. The parity-check matrices of these codes are block matrices consisting of circulant permutation matrices. It turns out that the $LU(m; q)$ codes proposed in the literature is a special case of this construction for prime q . Connectivity of Tanner graphs of these codes will also be discussed.