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Bounds on the minimum code distance for nonbinary codes based on bipartite graphs.
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Summary: The minimum distance of codes on bipartite graphs (BG codes) over $\text{GF}(q)$ is studied. A new upper bound on the minimum distance of BG codes is derived. The bound is shown to lie below the Gilbert-Varshamov bound when $q \geq 32$. Since the codes based on bipartite expander graphs (BEG codes) are a special case of BG codes and the resulting bound is valid for any BG code, it is also valid for BEG codes. Thus, nonbinary ($q \geq 32$) BG codes are worse than the best known linear codes. This is the key result of the work. We also obtain a lower bound on the minimum distance of BG codes with a Reed-Solomon constituent code and a lower bound on the minimum distance of low-density parity-check (LDPC) codes with a Reed-Solomon constituent code. The bound for LDPC codes is very close to the Gilbert-Varshamov bound and lies above the upper bound for BG codes.

MSC:

[94B60](#) Other types of codes

[94B65](#) Bounds on codes

Cited in **2** Documents

Full Text: [DOI](#)

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