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# QECCs FROM THE CONSTACYLIC CODES OVER THE RING $R = Fq[v]/\langle v^m - v\rangle$

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## ABSTRACT

In their 2024 study titled "Hulls of Constacyclic Codes over Finite Non-Chain Rings and Their Applications in Quantum Codes Construction", Tian, Gao, and Gao investigated $(1-2v)$ −constacyclic codes over the ring $R = \mathbb{F}_q + v\mathbb{F}_q \ \left(v^2 = v\right)$. They presented the generator polynomials of the hulls of such codes and determined their dimensions with respect to both Euclidean and Hermitian inner products. Moreover, under an appropriate Gray map, they proposed two new theorems for constructing quantum error-correcting codes (QECCs) using the X-quantum construction method with respect to Euclidean and Hermitian inner products. As a result, new QECCs with improved parameters compared to existing codes were introduced. This work is extended in the present study by generalizing their results to $\left(-2v^{m-1}+1\right)$ −constacyclic codes over the ring $R = \mathbb{F}_q + v\mathbb{F}_q + \cdots + v^{m-1}\mathbb{F}_q (q = p^s,\, m-1 | \, p-1,\, p$ is prime and $v^m = v)$.This generalization is carried out with respect to the Euclidean inner product.

***K*eywords** Hulls · Quantum Construction X Method · Constacyclic Codes

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