On quantum codes from cyclic codes over the nonchain ring

Muhammet Kurulay
Department of Mathematics
Yildiz Technical University, Istanbul 34000, Turkey
E-mail: muhammetkurulay@gmail.com

Let q be an odd prime power such that $q = p^m$, where p be an odd prime, m be a positive integer and $\mathbb{F}_q$ be the finite field of order q. The main aim of this paper is to study the structural properties of cyclic codes over the ring $R = \frac{\mathbb{F}_q[u,v]}{\langle u^2-\alpha^2, v^2-\beta^2, uv-vu\rangle}$, where α and β be the non zero elements of $\mathbb{F}_q$. By using orthogonal idempotents, we decompose the ring R. We also establish a necessary and sufficient condition for cyclic codes that contain their duals. Moreover, using the self-orthogonal condition of cyclic codes over R, we obtain better quantum codes than the existing quantum codes.