Some constructions of asymptotically optimal cyclic subspace codes

Chiara Castello and Paolo Santonastaso
University of Campania "L. Vanvitelli", Italy

A constant dimension subspace code $\mathcal{C}$ is a subset of the Grassmaniann $\mathcal{G}_q(n, k)$ endowed with the subspace distance. A cyclic subspace code $\mathcal{C}$ in $\mathcal{G}_q(n, k)$ is union of orbits of subspaces of $\mathbb{F}_{q^n}$ under the action of the multiplicative group of $\mathbb{F}_{q^n}$. In this talk, we introduce a new technique for constructing cyclic subspace codes with large cardinality and prescribed minimum distance. Using this new method, we provide new constructions of cyclic subspace codes in the Grassmannian $\mathcal{G}_q(n, k)$, where $k \mid n$ and n/k is a composite number, with minimum distance $2k - 2$ and large size. Precisely, we prove that the resulting codes have sizes larger than those obtained from previously known constructions with the same parameters. Furthermore, we prove that our constructions of cyclic subspace codes asymptotically reach the Johnson bound for infinite values of n/k.