Resolution of a Conjecture on an Upper Bound on The Covering Radius of a Linear Code over $\mathbb{F}_q$

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The covering radius of a q-ary block code C of length n is defined as the smallest integer $R = R(C)$ such that all vectors in $\mathbb{F}_q^n$ are within Hamming distance R of some codeword of C. By $[n, k, d]R$ code we mean an $[n, k, d]$ code having covering radius R. The covering radius of a code is one of the fundamental parameters of a code and gives its suitability for data compression, list decoding radius, and has many other applications. The upper bound of Janwa (1986) relates all the fundamental parameters as $R(C) \leq \mathcal{H}(C) := n - \sum_{i=1}^{k} \lceil \frac{d}{2^i} \rceil$. Which can be expressed as $n - g_q + d - \lceil d/q^k \rceil$. If $n_q(k, d)$ dents the minimum length of any code of dimension k and distance over $\mathbb{F}_q$ it was conjectured by Janwa that under certain conditions $g_q(k, d)$ (the Griesmer length) can be replaced by $n_q(k, d)$. Janwa (1989) and Janwa and Mattson (1999), proved three of the four cases. In this talk we will prove the fourth case. Thus resolving this conjecture.

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