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# On projective monomial curves associated to generalized arithmetic sequences

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Let $K$ be an infinite field and let $m_1 < \cdots < m_n$ be a generalized arithmetic sequence of positive integers, i.e., there exist $h, d, m_1 \in \mathbb{Z}^+$ such that $m_i = hm_1 + (i-1)d$ for all $i \in \{2, \ldots, n\}$. Assume that $n \geq 3$ and $\gcd(m_1, d) = 1$. We consider the projective monomial curve $\mathcal{C} \subset \mathbb{P}^n_K$ parametrically defined by

$$x_1 = s^{m_1} t^{m_n - m_1}, \ldots, x_{n-1} = s^{m_{n-1}} t^{m_n - m_{n-1}}, x_n = s^{m_n}, x_{n+1} = t^{m_n}.$$

In this work, we characterize both the Cohen-Macaulay and Koszul properties of the homogenous coordinate ring $K[\mathcal{C}]$ of $\mathcal{C}$ using computational techniques. Moreover, we obtain a formula for its Castelnuovo-Mumford regularity and also for the Hilbert series of $K[\mathcal{C}]$ in terms of the sequence, proving that the Castelnuovo-Mumford regularity of $K[\mathcal{C}]$ is attained at the last step of its minimal graded free resolution.

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