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Linear, non-homogeneous patterns in numerical semigroups associated to combinatorial configurations

Abstract A numerical semigroup is a subset $S \subset \mathbb{N} \cup \{0\}$, such that S is closed under addition, $0 \in S$ and the complement of S in $(\mathbb{N} \cup \{0\})$ is finite. A linear pattern of length n admitted by a numerical semigroup S is a linear polynomial $p(X1, ..., Xn)$ with non-zero integer coefficients, such that, for every ordered sequence of n elements $s_1 \geq \cdots \geq s_n$ from S, we have $p(s_1, ..., s_n) \in S$. A combinatorial (d, r, k)-configuration, with $d = vgcd(r, k)/k = bgcd(r, k)/r$, is an incidence geometry with v points and b lines, such that there are k points on every line, r lines through every point and two distinct points are on at most one line. Then d is always a natural number. Fixing r and k, the set of natural numbers d such that there exists at least one (d, r, k) configuration has the structure of a numerical semigroup, denoted $S(r, k)$. In this talk we show that the numerical semigroups $S(r, k)$ admit a family of linear, non-homogeneous patterns. This gives an upper bound of the conductor of such numerical semigroups. This is joint work with Maria Bras-Amorós.