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On the affine monomial curves

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Abstract

We use the corresponding numerical semigroup to an affine monomial curve to study arithmetic properties and invariants of its coordinate ring and tangent cone. As a main tool in this talk, we present the Apéry table and show how to read from it many properties of the tangent cone, in particular the Cohen-Macaulay, k -Buchsbaum and Gorenstein properties, or the Hilbert function and its behavior. In particular, we give new proofs for two conjectures raised by Sapko (Commun. Algebra **29**:4759–4773, 2001) and Shen (Commun. Algebra **39**:1922–1940, 2001), about monomial curves with Buchsbaum or 2-Buchsbaum tangent cones. We also provide a new simple proof in the case of monomial curves for Sally's conjecture (Numbers of Generators of Ideals in Local Rings, 1978) that the Hilbert function of a one-dimensional Cohen-Macaulay ring with embedding dimension three is non-decreasing. Finally, we obtain some new classes of monomial curves with non-decreasing Hilbert functions.