Abstract

Minimal Graded Resolutions of Monomial Curves
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Homogeneous co-ordinate ring of an affine monomial curve parameterized by $t \to t^{a_1}, \ldots, t^{a_n} \in \mathcal{A}^n$ is the semigroup ring $k[t^{a_1}, \ldots, t^{a_n}] = k[x_1, \ldots, x_n]/I_{\mathbf{a}}$, where $\mathbf{a} = \mathbf{a_1}, \ldots, \mathbf{a_n}$ minimally generate a numerical semigroup. The defining ideal $I_{\mathbf{a}}$ and various invariants of the associated semigroup rings have been studied for a long time. The ideal $I_{\mathbf{a}}$ is a binomial prime ideal of height $n-1$. When $n = 3$, in the case of space monomial curves, this defining ideal is determinantal, the ideal of 2×2 minors of a 2×3 matrix. From this, much of the information about the space monomial curves are known. For higher dimensions, structure of the ideal or the minimal resolutions is known if either the sequence $\mathbf{a}$ or the ideal $I_{\mathbf{a}}$ is special. We will discuss the problem of finding the graded minimal free resolutions of these curves and use it to determine the invariants. Specifically, in this talk, we will outline the minimal free resolutions for several classes of monomial curves. We will also construct explicitly the graded minimal free resolutions of monomial curves obtained by gluing and derive formulas for all the invariants that can be obtained from the numerical information from the resolution. Special cases in smaller embedding dimensions n, will be discussed.