

Research Highlights

Article

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Surface counterexamples to the Eisenbud-Goto conjecture,
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It is well known that the Eisenbud-Goto regularity conjecture is true for arithmetically Cohen-Macaulay varieties, projective curves, smooth surfaces, smooth threefolds in \mathbb{P}^5 , and toric varieties of codimension two. After J. McCullough and I. Peeva constructed counterexamples in 2018, it has been an interesting question to find the categories such that the Eisenbud-Goto conjecture holds. So far, surface counterexamples have not been found while counterexamples of any dimension greater or equal to 3 are known.

In this paper, we construct counterexamples to the Eisenbud-Goto conjecture for projective surfaces in \mathbb{P}^4 and investigate projective invariants, cohomological properties, and geometric properties. The counterexamples are constructed via binomial rational maps between projective spaces.

References

[1] D. Eisenbud and S. Goto, *Linear free resolutions and minimal multiplicity*, *J. Algebra* 88 (1984), 89–133.

[2] J. McCullough and I. Peeva, *Counterexamples to the Eisenbud-Goto regularity conjecture*, *J. Amer. Math. Soc.* 31 (2018), 473–496.