

The Toric ring of a squarefree ideal with two Borel generators is Koszul

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Let u and v be two squarefree monomials of the same degree in $S = K[x_1, \dots, x_n]$ the polynomial ring over K in n variables and let I be the smallest Borel squarefree ideal containing u and v . The main result that we show is that the toric ring of I , denoted $K[I]$ is Koszul. For that we construct a monomial order on the variables that yields a quadratic Groebner basis for the presenting toric ideal. The key ingredient to show the main result is the construction of a direct graph corresponding to fibers of the toric map. As a consequence, we conclude that the Rees algebra is also Koszul. Considering the class of t -spread strongly stable monomial ideals introduced by V. Ene, J. Herzog and A. Qureshi in 2018 we give an open problem linked to this result and a question put forward by Aldo Conca in 2016.