Binomial arithmetical rank of toric ideals associated with graphs

Toric ideals arise naturally in problems from diverse areas of mathematics, including algebraic statistics, integer programming, dynamical systems and graph theory. A basic problem in the theory of toric ideals is to determine the least number of polynomials needed to generate the toric ideal up to radical. This number is commonly known as the arithmetical rank of a toric ideal. A usual approach to this problem is to restrict to a certain class of polynomials and ask how many polynomials from this class can generate the toric ideal up to radical. Restricting the polynomials to the class of binomials we arrive at the notion of the binomial arithmetical rank of a toric ideal. In the talk we study the binomial arithmetical rank of the toric ideal associated with a finite graph in two cases:

(1) The graph is bipartite.

(2) The toric ideal is generated by quadratic binomials.

In both cases we prove that the binomial arithmetical rank equals the minimal number of generators of the toric ideal.