1171-13-224 Zachary Greif* (zsgreif@iastate.edu) and Jason McCullough. Linear Syzygies of Toric Edge Ideals of Bipartite Graph.

Let G be a finite, simple, bipartite graph and let K be a field. We consider the toric edge ideal of G, defined as the defining ideal of the K-algebra generated by all quadratic monomials associated to edges of G. Hibi and Ohsugi showed that G is generated by quadratic binomials if and only if G is chordal bipartite. We extend their result by giving a combinatorial characterization of graphs whose toric edge ideal is generated by quadratics and has linear first syzygies. I will discuss connections between this result and a question of Varbaro regarding the existence of families of quadratic ideals with linear syzygies and regularity growing linearly with embedding dimension. Additionally, we use our result to give similar combinatorial characterizations for toric ideals associated to polyominoes. (Received August 16, 2021)