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**Title:** Binomial Edge Ideals

**Abstract:** We introduce *binomial edge ideals* attached to a simple graph  $G$  and study their algebraic properties.

**Definition:** Let  $G$  be a simple graph on the vertex set  $[n] = \{1, \dots, n\}$ , that is to say,  $G$  has no loops and no multiple edges. Furthermore let  $K$  be a field and  $S = K[x_1, \dots, x_n, y_1, \dots, y_n]$  be the polynomial ring in  $2n$  variables. For  $i < j$  we set  $f_{ij} = x_i y_j - x_j y_i$ . We define the *binomial edge ideal*  $J_G \subset S$  of  $G$  as the ideal generated by the binomials  $f_{ij} = x_i y_j - x_j y_i$  such that  $i < j$  and  $\{i, j\}$  is an edge of  $G$ .

We characterize those graphs for which the quadratic generators form a Gröbner basis in a lexicographic order induced by a vertex labeling. Such graphs are chordal and claw-free. We give a reduced squarefree Gröbner basis for general  $G$ . It follows that all binomial edge ideals are radical ideals. Their minimal primes can be characterized by particular subsets of the vertices of  $G$ .

This is joint work with J. Herzog and T. Hibi.

## References

- [1] J. Herzog, T. Hibi, F. Hreinsdottir, T. Kahle and J. Rauh *Binomial ideals and conditional independence statements*, Advances in applied mathematics, in press, available online 19. feb. 2010.