Discrete Mathematics Seminar

Illinois State University

2:00–2:50 pm, April 20

Speaker: Papa Sissokho, Illinois State University

Non-negative Integer Solutions of Linear Equations and their Simplicial Complexes

Let A be an nxm-matrix of rank n with integer entries. Let S denote the set of all solutions x to the equation $Ax = 0$, where x is a vector with nonnegative integer entries. The Hilbert basis of S is the minimal subset H of S with the property that any solution x in S can be written as a nonnegative integer combination of solutions in H. For $n = 1$, we recently gave a geometric characterization of the Hilbert basis H. In our quest to extend this characterization to $n > 1$, we introduce simplicial complexes that can be associated with the set of nonnegative solutions S. We then prove that when $n = 2$, the resulting simplicial complex is always “regular” in a sense that generalizes the traditional notion of regularity in graphs.