1146-65-423 **Zhonggang Zeng*** (zzeng@neiu.edu), Department of Mathematics, Northeastern Illinois University, Northeastern Illinois University, Chicago, IL 60625. Large Sparse Rank-Revealing and its Applications in Numerical Polynomial Algebra.

Matrix rank-revealing is frequently encountered in polynomial algebraic computation, such as computing greatest common divisors, factorizations, multiplicity structures, and numerical eliminations. Due to large dimensions of polynomial vector spaces and usually sparse supports of the polynomials, matrices arising in those applications are usually very large and sparse, making the rank-revealing computation a challenge. In this talk we present simple templates for numerical rankrevealing and numerical kernel calculations for general large sparse matrices. Using the proposed templates, accurate numerical ranks and kernels can be efficiently computed using any existing sparse solvers for linear systems such as the Matlab built-in functionalities. Error analysis of the proposed rank-revealing templates and applications in numerical polynomial algebra will also be presented as well. (Received January 28, 2019)