



UNIVERSITY OF RHODE ISLAND

Department of Mathematics

Applied Mathematics and Scientific Computing Seminar

Location: Lippitt Hall 204

Time: Monday, April 8, 2019, 1:00pm
(refreshments at 12:50 p.m.)

A Fast Method for Computing the Largest Singular Triplet of a Very Large Sparse Matrix

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Abstract: The largest singular value and associated vectors, singular triplet, can be used in numerous applications, e.g. rank one approximation, two norm estimation, or data analysis (PCA - direction of maximal variance for statistical data). This talk will focus on the mathematics and development of a fast method for computing the largest singular triplet. The underlying mathematics for the development of this new method is based on a long history of methods in eigenvalue and singular value computations. The foundation is based on the commonly used Golub-Kahan-Lanczos Bidiagonalization (GKLB) procedure along with the methods of Krylov subspace augmentation, refined Ritz vectors approximations, and the nonlinear eigenvalue problem with eigenvector dependence (NEPv). Harnessing these connections led to the development of a simple, computationally fast, method for computing the largest singular triples that uses very little computer storage. Preliminary numerical examples will also be presented.