1135-65-2016 **Chao-Ping Lin*** (cplin@ucdavis.edu), Department of Mathematics, University of California, Davis, CA 95616, and **Huiqing Xie** and **Zhaojun Bai**. *On the Semi-definite B-Lanczos algorithm for sparse symmetric generalized eigenproblems.*

The shift-invert B-Lanczos algorithm is a variant of the symmetric Lanczos method for extracting eigenpairs of large eigenproblem $Ax = \lambda Bx$ around a shift, where A and B are symmetric and B is positive definite. A number of "industrial strength" black-box solvers are based on the algorithm. When B is semi-definite, since the algorithm does not require the inverse of B, it can proceed formally. It has been a common practice since the inception of the algorithm. However, it has been observed that the components of Lanczos vectors lying in the null space of B can grow rapidly and cause the failure of the algorithm. The issue has been studied where methods for purifying the null-space component have been proposed. Stewart examined the source and consequence of the growth, and concluded that the purifying will not restore the lost information. In this talk, we present an approach by introducing regularization to transform a semi-definite pencil into a definite one, assuming that a basis for the null space is available. The regularization scheme is embedded into the shift-invert spectral transformation, and existing solvers are immediately applicable. The efficacy of the proposed approach will be demonstrated by Stewart's example and real-life applications. (Received September 25, 2017)