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TIKHONOV REGULARIZATION WITH NONNEGATIVITY CONSTRAINT *

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Abstract. Many numerical methods for the solution of ill-posed problems are based on Tikhonov regularization. Recently, Rojas and Steihaug [15] described a barrier method for computing nonnegative Tikhonov-regularized approximate solutions of linear discrete ill-posed problems. Their method is based on solving a sequence of parameterized eigenvalue problems. This paper describes how the solution of parametrized eigenvalue problems can be avoided by computing bounds that follow from the connection between the Lanczos process, orthogonal polynomials and Gauss quadrature.

Key words. ill-posed problem, inverse problem, solution constraint, Lanczos methods, Gauss quadrature.

AMS subject classifications. 65F22, 65F10, 65R30, 65R32, 65R20.

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