1023-49-1647 **Elaine T. Hale*** (ehale@rice.edu), Rice University, Dept. of Comp. and Applied Math., 6100 Main St., MS 134, Houston, TX 77005-1892, and **Yin Zhang**. *Convergence Rate of an Interior Point Gradient Method for the Totally Non-Negative Least Squares Problem.* Preliminary report.

The totally non-negative least squares problem is

$$\min_{x \geq 0} \frac{1}{2} \|Ax - b\|_2^2 ,$$

where all of $A$'s elements are non-negative; all of $b$'s elements are strictly positive; and $A$ is full rank, has more rows than columns, and has no zero rows. This constrained convex optimization problem arises in many applications. For some, the problem can be so large that it is impractical to compute any matrix inverses. Therefore, this paper concentrates on algorithms for the above problem that only require scalar arithmetic and matrix-vector multiplication.

In particular, the algorithm introduced by Merritt and Zhang, 2005, is shown here via numerical experiment to outperform other interior point gradient methods and an instance of the class of algorithms proposed in Auslender and Teboulle, 2006. The results are dramatic enough to suggest that Merritt and Zhang's algorithm may have a convergence rate superior to any known for this problem (under the restriction cited above). Therefore, this paper also discusses the authors' efforts and results concerning convergence rates for this algorithm.

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