The logarithmic method for solving nonlinear problems: some successes

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Abstract

By taking the proper view in exponent space, some difficult-appearing nonlinear problems may be transformed to tractable cone-theoretic problems. Often a transformation between a half-space description and a generator description of a cone is key.

Our purpose is to summarize two nice and rather different examples of this technique. Each leads to rather striking results in its own setting. We suspect that many more examples are possible.

The two examples we discuss are

- 1. the completion problem for TP2 matrices (all 1-by-1 and 2-by-2 minors are positive they play a key role in the theory of total positivity), and
- 2. determinantal inequalities for positive definite matrices.

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