Tractable Approximate Robust Geometric Programming

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- rgp-full.pdf
- rgp.pdf
- Matlab function for best approximation of two-term log-sum-exp function.

The optimal solution of a geometric program (GP) can be sensitive to variations in the problem data. Robust geometric programming can systematically alleviate the sensitivity problem by explicitly incorporating a model of data uncertainty in a GP and optimizing for the worst-case scenario under this model. However, it is not known whether a general robust GP can be reformulated as a tractable optimization problem that interior-point or other algorithms can efficiently solve. In this paper we propose an approximation method that seeks a compromise between solution accuracy and computational efficiency. The method is based on approximating the robust GP as a robust linear program (LP), by replacing each nonlinear constraint function with a piecewise linear (PWL) convex approximation. With a polyhedral or ellipsoidal description of the uncertain data, the resulting robust LP can be formulated as a standard convex optimization

problem that interior-point methods can solve. The drawback of this basic method is that the number of terms in the PWL approximations required to obtain an acceptable approximation error can be very large. To overcome the curse of dimensionality that arises in directly