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SOCP Relaxation of Sensor Network Localization

We study a second-order cone programming (SOCP) relaxation of the NP-hard sensor network localization problem. We show that SOCP relaxation, though weaker than SDP relaxation, has nice properties that make it useful as a problem preprocessor. In particular, an error bound result shows that sensors that are uniquely positioned among interior solutions of the SOCP relaxation are accurate up to the square root of the distance error. Thus, these sensors, which can be easily identified, are accurately positioned. In our numerical simulation, the interior solution found can accurately position up to 80–90% of the sensors. We also propose a smoothing coordinate gradient descent method for finding an interior solution faster than using SeDuMi.