Underlying Paths in Interior Point Method for Monotone Semidefinite Linear Complementarity Problem

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Abstract   *An interior point method (IPM) defines a search direction at an interior point of the feasible region. These search directions form a direction field which in turn defines, as the unique solution of a system of ordinary differential equations (ODEs), a curve passing through any interior point. We call such curves off-central paths (the central path is trivial for analysis; our concern is off-central paths, so the name). We study off-central paths for monotone semidefinite linear complementarity problem (SDLCP). We show that each off-central path is a well-defined analytic curve with parameter μ ranging over $(0, \infty)$ and any accumulation point of the off-central path is a solution to SDLCP. Through a simple example we show that the off-central paths are not analytic as a function of $\sqrt{\mu}$ and whose first derivatives are unbounded as a function of μ at $\mu = 0$ in general. On the other hand, for the same example, we can find a subset of off-central paths which are analytic at $\mu = 0$. These "nice" paths are characterized by some algebraic equations.*

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