Dynamics of Continuous, Discrete and Impulsive Systems
Series **B:** *Applications & Algorithms* **17 (2010)** 769-783
 http://www.watam.org

A NEW PATH-FOLLOWING INTERIOR-POINT ALGORITHM FOR MONOTONE SEMIDEFINITE LINEAR COMPLEMENTARITY PROBLEMS*

Y.Q. Bai[1,2], L.M. Sun[1] and Y. Chen[1]

[1]Department of Mathematics Shanghai University, Shanghai, P. R. China

[2]Corresponding author. email: yqbai@shu.edu.cn

Abstract. We present a new path-following interior-point algorithm for a special format of monotone semidefinite linear complementarity problems. The search direction of algorithm is based on a mapping of the central path to $v-$ space in term of a univariate function. The full-Newton step is used for each iteration. The quadratic convergence is obtained. Furthermore, the complexity bound of algorithm is derived for small-update methods. It is as good as that for linear case. The analysis used in this paper is more straightforward.

Keywords. Monotone semidefinite linear complementarity problems; Interior-point algorithm; Small-update method; Full-Newton step; Polynomial complexity.

AMS (MOS) subject classification: 65Y20, 90C22, 90C30, 90C51.

1 Introduction

In this paper, we consider the following special format of monotone semidefinite linear complementarity problems (SDLCPs) of finding a pair (X, S) such that

$$S = MX + XM + Q, \quad (X, S) \in (S^n_+, S^n_+), \quad X \bullet S = 0, \tag{1}$$

where $M \in S^n_{++}$ and $Q \in S^n$.

SDLCPs were introduced by Kojima, Shindoh, and Hara [11] as a model unifying various problems arising from system and control theory and combinatorial optimization. Monotone SDLCPs can be regarded as a generalization of the (standard) linear complementarity problems (LCPs) [5, 7]. It includes semidefinite optimization (SDO) [12]. Recently, much emphasis is put on

*This research is supported by National Natural Science Foundation of China (NO. 10117733), the Doctoral Program of Higher Education (RFDP) (NO. 200802800010) and the Key Disciplines of Shanghai Municipality (NO. S30104).