Abstract

The implicit Lagrangian was first proposed by Mangasarian and Solodov as a smooth merit function for the nonnegative orthant complementarity problem. It has attracted much attention in the past ten years because of its utility in reformulating complementarity problems as unconstrained minimization problems. In this paper, exploiting the Jordan-algebraic structure, we extend it to the vector-valued implicit Lagrangian for symmetric cone complementarity problem (SCCP), and show that it is a continuously differentiable and strongly semismooth complementarity function for SCCP. As an application, we develop the real-valued implicit Lagrangian and the corresponding smooth merit function for SCCP, and give a necessary and sufficient condition for the stationary point of the merit function to be a solution of SCCP. Finally, we show that this merit function can provide a global error bound for SCCP with the uniform Cartesian P-property.