Smoothing Methods for
General Nonlinear Complementarity Problems

Reporter:　Yu-Fei Yang

Department of Applied Mathematics, The Hong Kong Polytechnic University, Hong Kong, China
College of Mathematics and Econometrics, Hunan University, Changsha, China

We study numerical methods for solving general nonlinear complementarity problems. The nonlinear complementarity problem has many important applications in economics and engineering, and there have developed many numerical methods to solve this class of problems. In the last years much attention has been devoted to reformulating the nonlinear complementarity problem as a system of nonsmooth equations by using some NCP function.

Trust region methods are reliable and robust, and have very good convergence properties. In this paper, based on reformulating the nonlinear complementarity problem as a system of nonsmooth equations by using Fischer-Burmeister function, a smoothing method, which combines trust region and line search strategy, is proposed for solving the nonlinear complementarity problem. This method is well-defined for an arbitrary nonlinear complementarity problem. We prove that our method is globally convergent, and under the condition that the solution is R-regular, convergence rate is Q-superlinear/ Q-quadratic.

Key words:　Nonlinear complementarity problem; trust region method; global convergence; local superlinear/quadratic convergence