

APPLYING SEMISMOOTH NEWTON METHOD TO FIND FIXED POINTS OF NONSMOOTH FUNCTIONS OF ONE VARIABLE

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Abstract:

In this paper, we investigate the problem of finding a fixed point of the nonsmooth function, $\max f_1(x), f_2(x), \dots, f_n(x)$. First, we recall the definition of Newton derivative and examine some basic properties. Then, we investigate the Newton differentiability of function $\max f_1(x), f_2(x), \dots, f_n(x)$. We give the necessary and sufficient conditions for Newton differentiability of this function in two cases: A special case: $\max f_1(x), f_2(x)$ and the general case: $\max f_1(x), f_2(x), \dots, f_n(x)$. We emphasize that, the sufficient condition for the special case is much weaker than that of the general case. After that, we apply the semismooth Newton method to find a fixed point of the above function. The local quadratic order convergence of the method is proven. Finally, we present the numerical results for some specific examples.

Key words: Newton Derivative; Newton differential; Fixed point; Semismooth Newton method; Nonsmooth function