عنوان مقاله:

Two Time Scale Model for Zero Finding Problems Based on Backstepping Control Technique

محل انتشار:

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خلاصه مقاله:

In recent years, along with the industrial developments numerical methods have received a great amount of attention by researchers to solve various complex non-linear problems such as solving nonlinear equations, optimizing problems, solving numerical differential equations and so on. Despite many similarities, existing algorithms do not guarantee achieving the appropriate result and convergence. In order to achieve the appropriate result, various conditions such as a starting point for an iterative algorithm, the step size, the direction and etc. must be provided. Moreover, these algorithms are mostly able to find the local minima Control-Theoretic Approaches are utilized to design a framework to solve numerical algorithms. In this paper, novel methods are proposed to solve nonlinear equations and optimization problems based on two-time scale method. This paper provides a new control theoretic framework is presented to derive some iterative methods which is applied in zero finding problems and optimization problems in a systematic manner. We present a new dynamical model for zero finding problems on the basis of two-time scale method using backstepping control technique in nonlinear control theories. This method expresses the control law as a fast dynamic, where it is not necessary to calculate the inversion of Jacobian or Hessian matrix and the convergence rate would be magnificently improved. Using this dynamical system some characteristics such as convergence rate and robustness are modified. Also, Using the Lyapunov stability theorem, we can show that this dynamical system is asymptotically stable and a solution of zero finding problems, will be satisfied. Finally, simulation results of the proposed methods are presented to illustrate the effectiveness of these.

کلمات کلیدی:

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