

1. Record Nr.	UNINA9910678005903321
Autore	Xiao Lin
Titolo	Zeroing neural networks : finite-time convergence design, analysis and applications / / Lin Xiao and Lei Jia
Pubbl/distr/stampa	Piscataway, New Jersey ; ; Hoboken, New Jersey : , : IEEE Press : , : Wiley, , [2023] ©2023
ISBN	1-119-98604-4 1-119-98602-8 1-119-98603-6
Descrizione fisica	1 online resource (435 pages)
Disciplina	006.32
Soggetti	Neural networks (Computer science) Nonlinear difference equations
Lingua di pubblicazione	Inglese
Formato	Materiale a stampa
Livello bibliografico	Monografia
Nota di bibliografia	Includes bibliographical references and index.
Nota di contenuto	Cover -- Title Page -- Copyright -- Contents -- List of Figures -- List of Tables -- Author Biographies -- Preface -- Acknowledgments -- Part I Application to Matrix Square Root -- Chapter 1 FTZNN for Time varying Matrix Square Root -- 1.1 Introduction -- 1.2 Problem Formulation and ZNN Model -- 1.3 FTZNN Model -- 1.3.1 Model Design -- 1.3.2 Theoretical Analysis -- 1.4 Illustrative Verification -- 1.5 Chapter Summary -- References -- Chapter 2 FTZNN for Static Matrix Square Root -- 2.1 Introduction -- 2.2 Solution Models -- 2.2.1 OZNN Model -- 2.2.2 FTZNN Model -- 2.3 Illustrative Verification -- 2.3.1 Example 1 -- 2.3.2 Example 2 -- 2.4 Chapter Summary -- References -- Part II Application to Matrix Inversion -- Chapter 3 Design Scheme I of FTZNN -- 3.1 Introduction -- 3.2 Problem Formulation and Preliminaries -- 3.3 FTZNN Model -- 3.3.1 Model Design -- 3.3.2 Theoretical Analysis -- 3.4 Illustrative Verification -- 3.4.1 Example 1: Nonrandom Timevarying Coefficients -- 3.4.2 Example 2: Random Timevarying Coefficients -- 3.5 Chapter Summary -- References -- Chapter 4 Design Scheme II of FTZNN -- 4.1 Introduction -- 4.2 Preliminaries -- 4.2.1 Mathematical Preparation -- 4.2.2 Problem Formulation -- 4.3 NTFTZNN Model -- 4.4 Theoretical

Analysis -- 4.4.1 NTFTZNN in the Absence of Noises -- 4.4.2 NT  
FTZNN in the Presence of Noises -- 4.4.2.1 Dynamic Bounded  
Gradually Disappearing Noise -- 4.4.2.2 Dynamic Bounded Non  
disappearing Noise -- 4.5 Illustrative Verification -- 4.5.1 Example 1:  
Twodimensional Coefficient -- 4.5.2 Example 2: Sixdimensional  
Coefficient -- 4.5.3 Example 3: Application to Mobile Manipulator --  
4.5.4 Example 4: Physical Comparative Experiments -- 4.6 Chapter  
Summary -- References -- Chapter 5 Design Scheme III of FTZNN --  
5.1 Introduction -- 5.2 Problem Formulation and Neural Solver -- 5.2.1  
FPZNN Model.  
5.2.2 IVPFTZNN Model -- 5.3 Theoretical Analysis -- 5.4 Illustrative  
Verification -- 5.4.1 Example 1: TwoDimensional Coefficient -- 5.4.2  
Example 2: ThreeDimensional Coefficient -- 5.5 Chapter Summary --  
References -- Part III Application to Linear Matrix Equation -- Chapter  
6 Design Scheme I of FTZNN -- 6.1 Introduction -- 6.2 Convergence  
Speed and Robustness Codesign -- 6.3 RFTZNN Model -- 6.3.1  
Design of RFTZNN -- 6.3.2 Analysis of RFTZNN -- 6.4 Illustrative  
Verification -- 6.4.1 Numerical Example -- 6.4.1.1 No Noise  
Considered -- 6.4.1.2 With Noises Considered -- 6.4.2 Applications:  
Robotic Motion Tracking -- 6.5 Chapter Summary -- References --  
Chapter 7 Design Scheme II of FTZNN -- 7.1 Introduction -- 7.2  
Problem Formulation -- 7.3 FTZNN Model -- 7.4 Theoretical Analysis  
-- 7.4.1 Convergence -- 7.4.2 Robustness -- 7.5 Illustrative  
Verification -- 7.5.1 Convergence -- 7.5.2 Robustness -- 7.6 Chapter  
Summary -- References -- Part IV Application to Optimization --  
Chapter 8 FTZNN for Constrained Quadratic Programming -- 8.1  
Introduction -- 8.2 Preliminaries -- 8.2.1 Problem Formulation --  
8.2.2 Optimization Theory -- 8.3 UFTZNN Model -- 8.4 Convergence  
Analysis -- 8.5 Robustness Analysis -- 8.6 Illustrative Verification --  
8.6.1 Qualitative Experiments -- 8.6.2 Quantitative Experiments -- 8.7  
Application to Image Fusion -- 8.8 Application to Robot Control -- 8.9  
Chapter Summary -- References -- Chapter 9 FTZNN for Nonlinear  
Minimization -- 9.1 Introduction -- 9.2 Problem Formulation and ZNN  
Models -- 9.2.1 Problem Formulation -- 9.2.2 ZNN Model -- 9.2.3  
RZNN Model -- 9.3 Design and Analysis of RFTZNN -- 9.3.1 Second  
Order Nonlinear Formula -- 9.3.2 RFTZNN Model -- 9.4 Illustrative  
Verification -- 9.4.1 Constant Noise -- 9.4.2 Dynamic Noise -- 9.5  
Chapter Summary -- References -- Chapter 10 FTZNN for Quadratic  
Optimization.  
10.1 Introduction -- 10.2 Problem Formulation -- 10.3 Related Work:  
GNN and ZNN Models -- 10.3.1 GNN Model -- 10.3.2 ZNN Model --  
10.4 NFTZNN Model -- 10.4.1 Models Comparison -- 10.4.2 Finite  
Time Convergence -- 10.5 Illustrative Verification -- 10.6 Chapter  
Summary -- References -- Part V Application to the Lyapunov Equation  
-- Chapter 11 Design Scheme I of FTZNN -- 11.1 Introduction -- 11.2  
Problem Formulation and Related Work -- 11.2.1 GNN Model -- 11.2.2  
ZNN Model -- 11.3 FTZNN Model -- 11.4 Illustrative Verification --  
11.5 Chapter Summary -- References -- Chapter 12 Design Scheme II  
of FTZNN -- 12.1 Introduction -- 12.2 Problem Formulation and  
Preliminaries -- 12.3 FTZNN Model -- 12.3.1 Design of FTZNN --  
12.3.2 Analysis of FTZNN -- 12.4 Illustrative Verification -- 12.5  
Application to Tracking Control -- 12.6 Chapter Summary --  
References -- Chapter 13 Design Scheme III of FTZNN -- 13.1  
Introduction -- 13.2 NFTZNN Model -- 13.2.1 Design of NFTZNN --  
13.2.2 ReInterpretation from Nonlinear PID Perspective -- 13.3  
Theoretical Analysis -- 13.4 Illustrative Verification -- 13.4.1  
Numerical Comparison -- 13.4.2 Application Comparison -- 13.4.3  
Experimental Verification -- 13.5 Chapter Summary -- References --

Part VI Application to the Sylvester Equation -- Chapter 14 Design Scheme I of FTZNN -- 14.1 Introduction -- 14.2 Problem Formulation and ZNN Model -- 14.3 NFTZNN Model -- 14.3.1 Design of NFTZNN -- 14.3.2 Theoretical Analysis -- 14.4 Illustrative Verification -- 14.5 Robotic Application -- 14.6 Chapter Summary -- References -- Chapter 15 Design Scheme II of FTZNN -- 15.1 Introduction -- 15.2 ZNN Model and Activation Functions -- 15.2.1 ZNN Model -- 15.2.2 Commonly Used AFs -- 15.2.3 Two Novel Nonlinear AFs -- 15.3 NT PTZNN Models and Theoretical Analysis -- 15.3.1 NTPTZNN1 Model -- 15.3.1.1 Case 1 -- 15.3.1.2 Case 2 -- 15.3.2 NTPTZNN2 Model -- 15.3.2.1 Case 1 -- 15.3.2.2 Case 2 -- 15.4 Illustrative Verification -- 15.4.1 Example 1 -- 15.4.2 Example 2 -- 15.4.3 Example 3 -- 15.5 Chapter Summary -- References -- Chapter 16 Design Scheme III of FTZNN -- 16.1 Introduction -- 16.2 ZNN Model and Activation Function -- 16.2.1 ZNN Model -- 16.2.2 Signbipower Activation Function -- 16.3 FTZNN Models with Adaptive Coefficients -- 16.3.1 SAFTZNN Model -- 16.3.2 PAFTZNN Model -- 16.3.3 EAFTZNN Model -- 16.4 Illustrative Verification -- 16.5 Chapter Summary -- References -- Part VII Application to Inequality -- Chapter 17 Design Scheme I of FTZNN -- 17.1 Introduction -- 17.2 FTZNN Models Design -- 17.2.1 Problem Formulation -- 17.2.2 ZNN Model -- 17.2.3 Vectorization -- 17.2.4 Activation Functions -- 17.2.5 FTZNN Models -- 17.3 Theoretical Analysis -- 17.3.1 Global Convergence -- 17.3.2 FiniteTime Convergence -- 17.4 Illustrative Verification -- 17.5 Chapter Summary -- References -- Chapter 18 Design Scheme II of FTZNN -- 18.1 Introduction -- 18.2 NTFTZNN Model Deisgn -- 18.2.1 Problem Formulation -- 18.2.2 ZNN Model -- 18.2.3 NTFTZNN Model -- 18.2.4 Activation Functions -- 18.3 Theoretical Analysis -- 18.3.1 Global Convergence -- 18.3.2 FiniteTime Convergence -- 18.3.3 NoiseTolerant Convergence -- 18.4 Illustrative Verification -- 18.5 Chapter Summary -- References -- Part VIII Application to Nonlinear Equation -- Chapter 19 Design Scheme I of FTZNN -- 19.1 Introduction -- 19.2 Model Formulation -- 19.2.1 OZNN Model -- 19.2.2 FTZNN Model -- 19.2.3 Models Comparison -- 19.3 Convergence Analysis -- 19.4 Illustrative Verification -- 19.4.1 Nonlinear Equation  $f(u)$  with Simple Root -- 19.4.2 Nonlinear Equation  $f(u)$  with Multiple Root -- 19.5 Chapter Summary -- References -- Chapter 20 Design Scheme II of FTZNN -- 20.1 Introduction -- 20.2 Problem and Model Formulation. 20.2.1 GNN Model -- 20.2.2 OZNN Model -- 20.3 FTZNN Model and FiniteTime Convergence -- 20.4 Illustrative Verification -- 20.5 Chapter Summary -- References -- Chapter 21 Design Scheme III of FTZNN -- 21.1 Introduction -- 21.2 Problem Formulation and ZNN Models -- 21.2.1 Problem Formulation -- 21.2.2 ZNN Model -- 21.3 Robust and FixedTime ZNN Model -- 21.4 Theoretical Analysis -- 21.4.1 Case 1: No Noise -- 21.4.2 Case 2: Under External Noises -- 21.5 Illustrative Verification -- 21.6 Chapter Summary -- References -- Index -- EULA.

---