

Bibliography

- [1] Mohamed Ibnkahla. Applications of neural networks to digital communications—a survey. *Signal processing*, 80(7):1185–1215, 2000.
- [2] Alan F Murray. *Applications of neural networks*. Springer, 1995.
- [3] Rao S Govindaraju and Adishesappa Ramachandra Rao. *Artificial neural networks in hydrology*, volume 36. Springer Science & Business Media, 2013.
- [4] Akira Hirose. *Complex-valued neural networks*, volume 400. Springer Science & Business Media, 2012.
- [5] SL Goh, M Chen, DH Popović, K Aihara, D Obradovic, and DP Mandic. Complex-valued forecasting of wind profile. *Renewable Energy*, 31(11):1733–1750, 2006.
- [6] Shadab Shishegar, Reza Ghorbani, Lyes Saad Saoud, Sophie Duchesne, and Geneviève Pelletier. Rainfall–runoff modelling using octonion-valued neural networks. *Hydrological Sciences Journal*, 66(13):1857–1865, 2021.
- [7] Alex O Acheampong and Emmanuel B Boateng. Modelling carbon emission intensity: Application of artificial neural network. *Journal of Cleaner Production*, 225:833–856, 2019.

-
- [8] RC Eberhart and RW Dobbins. Early neural network development history: the age of camelot. *IEEE Engineering in Medicine and Biology Magazine*, 9(3):15–18, 1990.
 - [9] Jack D Cowan. Discussion: Mcculloch-pitts and related neural nets from 1943 to 1989. *Bulletin of mathematical biology*, 52(1-2):73–97, 1990.
 - [10] Jiayu Qiu, Bin Wang, and Changjun Zhou. Forecasting stock prices with long-short term memory neural network based on attention mechanism. *PloS one*, 15(1):e0227222, 2020.
 - [11] Hossein Moayedi, Mansour Mosallanezhad, Ahmad Safuan A Rashid, Wan Amizah Wan Jusoh, and Mohammed Abdullahi Muazu. A systematic review and meta-analysis of artificial neural network application in geotechnical engineering: theory and applications. *Neural Computing and Applications*, 32:495–518, 2020.
 - [12] Adriana Albu, Radu-Emil Precup, and Teodor-Adrian Teban. Results and challenges of artificial neural networks used for decision-making and control in medical applications. *Facta Universitatis, Series: Mechanical Engineering*, 17(3):285–308, 2019.
 - [13] Andrea Apicella, Francesco Donnarumma, Francesco Isgrò, and Roberto Prevete. A survey on modern trainable activation functions. *Neural Networks*, 138:14–32, 2021.
 - [14] Jiong Si, Sarah L Harris, and Evangelos Yfantis. A dynamic relu on neural network. In *2018 IEEE 13th Dallas Circuits and Systems Conference (DCAS)*, pages 1–6. IEEE, 2018.

-
- [15] Zaiyong Tang and Paul A Fishwick. Feedforward neural nets as models for time series forecasting. *ORSA journal on computing*, 5(4):374–385, 1993.
 - [16] Fadi Aldakheel, Ramish Satari, and Peter Wriggers. Feed-forward neural networks for failure mechanics problems. *Applied Sciences*, 11(14):6483–6505, 2021.
 - [17] Larry R Medsker and LC Jain. Recurrent neural networks. *Design and Applications*, 5:64–67, 2001.
 - [18] Arkady Pikovsky, Michael Rosenblum, and Jürgen Kurths. Synchronization: A universal concept in nonlinear sciences. *Cambridge University Press*, 2001.
 - [19] Chuangxia Huang and Bingwen Liu. New studies on dynamic analysis of inertial neural networks involving non-reduced order method. *Neurocomputing*, 325:283–287, 2019.
 - [20] C.A. Popa. Global exponential stability of octonion-valued neural networks with leakage delay and mixed delays. *Neural Networks*, 105:277–293, 2018.
 - [21] Rodney David Driver. *Ordinary and delay differential equations*, volume 20. Springer Science & Business Media, 2012.
 - [22] Kenneth L Cooke and Zvi Grossman. Discrete delay, distributed delay and stability switches. *Journal of mathematical analysis and applications*, 86(2):592–627, 1982.
 - [23] Jianquan Lu, Daniel WC Ho, and Jinde Cao. A unified synchronization criterion for impulsive dynamical networks. *Automatica*, 46(7):1215–1221, 2010.
 - [24] Jiye Zhang. Globally exponential stability of neural networks with variable delays. *IEEE Transactions on Circuits and Systems I: Fundamental Theory and Applications*, 50(2):288–290, 2003.

-
- [25] Peter Dorato. An overview of finite-time stability. *Current trends in nonlinear systems and control: In honor of Petar Kokotović and Turi Nicosia*, pages 185–194, 2006.
 - [26] Cheng Hu, Haibo He, and Haijun Jiang. Fixed/preassigned-time synchronization of complex networks via improving fixed-time stability. *IEEE transactions on cybernetics*, 51(6):2882–2892, 2020.
 - [27] Michael Athans and Peter L Falb. *Optimal control: an introduction to the theory and its applications*. Courier Corporation, 2013.
 - [28] Yiguang Hong, Yangsheng Xu, and Jie Huang. Finite-time control for robot manipulators. *Systems & control letters*, 46(4):243–253, 2002.
 - [29] Yang Liu, Hongyi Li, Renquan Lu, Zongyu Zuo, and Xiaodi Li. An overview of finite/fixed-time control and its application in engineering systems. *IEEE/CAA Journal of Automatica Sinica*, 9(12):2106–2120, 2022.
 - [30] Andrey Polyakov. Nonlinear feedback design for fixed-time stabilization of linear control systems. *IEEE Transactions on Automatic Control*, 57(8):2106–2110, 2011.
 - [31] Esteban Jiménez-Rodríguez, Aldo Jonathan Muñoz-Vázquez, Juan Diego Sánchez-Torres, and Alexander G Loukianov. A note on predefined-time stability. *IFAC-PapersOnLine*, 51(13):520–525, 2018.
 - [32] Esteban Jiménez-Rodríguez, Aldo Jonathan Muñoz-Vázquez, Juan Diego Sánchez-Torres, Michael Defoort, and Alexander G Loukianov. A lyapunov-like characterization of predefined-time stability. *IEEE Transactions on Automatic Control*, 65(11):4922–4927, 2020.

-
- [33] Feng Wang, Yue Miao, Chaoyong Li, and Inseok Hwang. Attitude control of rigid spacecraft with predefined-time stability. *Journal of the Franklin Institute*, 357(7):4212–4221, 2020.
- [34] Ziad Zahreddine. Matrix measure and application to stability of matrices and interval dynamical systems. *International Journal of Mathematics and Mathematical Sciences*, 2003(2):75–85, 2003.
- [35] Hassan K Khalil. *Nonlinear control*, volume 406. Pearson New York, 2015.
- [36] EM Shahverdiev, S Sivaprakasam, and KA Shore. Lag synchronization in time-delayed systems. *Physics Letters A*, 292(6):320–324, 2002.
- [37] Ido Kanter, Wolfgang Kinzel, and Eran Kanter. Secure exchange of information by synchronization of neural networks. *Europhysics Letters*, 57(1):141, 2002.
- [38] Bin Hu, Zhi-Hong Guan, Naixue Xiong, and Han-Chieh Chao. Intelligent impulsive synchronization of nonlinear interconnected neural networks for image protection. *IEEE Transactions on Industrial Informatics*, 14(8):3775–3787, 2018.
- [39] Jun Ma, Fan Li, Long Huang, and Wu-Yin Jin. Complete synchronization, phase synchronization and parameters estimation in a realistic chaotic system. *Communications in Nonlinear Science and Numerical Simulation*, 16(9):3770–3785, 2011.
- [40] Jinde Cao and Jianquan Lu. Adaptive synchronization of neural networks with or without time-varying delay. *Chaos: An Interdisciplinary Journal of Nonlinear Science*, 16(1), 2006.

-
- [41] Ze Tang, Ju H Park, and Jianwen Feng. Impulsive effects on quasi-synchronization of neural networks with parameter mismatches and time-varying delay. *IEEE Transactions on Neural Networks and Learning Systems*, 29(4):908–919, 2017.
- [42] Juergen Fell and Nikolai Axmacher. The role of phase synchronization in memory processes. *Nature reviews neuroscience*, 12(2):105–118, 2011.
- [43] Michael G Rosenblum, Arkady S Pikovsky, and Jürgen Kurths. From phase to lag synchronization in coupled chaotic oscillators. *Physical Review Letters*, 78(22):4193, 1997.
- [44] Takatomo Mihana, Kiyohiro Fujii, Kazutaka Kanno, Makoto Naruse, and Atsushi Uchida. Laser network decision making by lag synchronization of chaos in a ring configuration. *Optics Express*, 28(26):40112–40130, 2020.
- [45] Malik Muhammad Ibrahim, Muhammad Ahmad Kamran, Malik Muhammad Naeem Mannan, Il Hyo Jung, and Sangil Kim. Lag synchronization of coupled time-delayed fitzhugh–nagumo neural networks via feedback control. *Scientific reports*, 11(1):3884, 2021.
- [46] Changqing Long, Guodong Zhang, Zhigang Zeng, and Junhao Hu. Finite-time lag synchronization of inertial neural networks with mixed infinite time-varying delays and state-dependent switching. *Neurocomputing*, 433:50–58, 2021.
- [47] Hongjuan Wu, Chuandong Li, Zhilong He, Yinuo Wang, and Yingying He. Lag synchronization of nonlinear dynamical systems via asymmetric saturated impulsive control. *Chaos, Solitons & Fractals*, 152:111290, 2021.

-
- [48] Hongyong Zhao and Qi Zhang. Global impulsive exponential anti-synchronization of delayed chaotic neural networks. *Neurocomputing*, 74(4):563–567, 2011.
- [49] Qiankun Song and Jinde Cao. Synchronization and anti-synchronization for chaotic systems. *Chaos, Solitons & Fractals*, 33(3):929–939, 2007.
- [50] Wanli Zhang, Chuandong Li, Tingwen Huang, and Junjian Huang. Fixed-time synchronization of complex networks with nonidentical nodes and stochastic noise perturbations. *Physica A: Statistical Mechanics and its Applications*, 492:1531–1542, 2018.
- [51] Grienggrai Rajchakit, Pharunyou Chanthorn, Pramet Kaewmesri, Ramalingam Sriraman, and Chee Peng Lim. Global mittag–leffler stability and stabilization analysis of fractional-order quaternion-valued memristive neural networks. *Mathematics*, 8(3):422, 2020.
- [52] Teiji Isokawa, Tomoaki Kusakabe, Nobuyuki Matsui, and Ferdinand Peper. Quaternion neural network and its application. *International conference on knowledge-based and intelligent information and engineering systems*, 2003.
- [53] Yingjiang Zhou and Changyin Sun. Fixed time synchronization of complex dynamical networks. *Proceedings of the Chinese intelligent automation conference*, 2015.
- [54] Xinsong Yang, James Lam, Daniel WC Ho, and Zhiguo Feng. Fixed-time synchronization of complex networks with impulsive effects via nonchattering control. *IEEE Transactions on Automatic Control*, 62(11):5511–5521, 2017.

-
- [55] Leimin Wang, Zhigang Zeng, Junhao Hu, and Xiaoping Wang. Controller design for global fixed-time synchronization of delayed neural networks with discontinuous activations. *Neural Networks*, 87:122–131, 2017.
- [56] Hui Deng and Haibo Bao. Fixed-time synchronization of quaternion-valued neural networks. *Physica A: Statistical Mechanics and its Applications*, 527:121351, 2019.
- [57] Qi Wang, Yayun Fang, Hui Li, Lijuan Su, and Binxiang Dai. Anti-periodic solutions for high-order hopfield neural networks with impulses. *Neurocomputing*, 138:339–346, 2014.
- [58] Anping Chen and Jinde Cao. Existence and attractivity of almost periodic solutions for cellular neural networks with distributed delays and variable coefficients. *Applied Mathematics and Computation*, 134(1):125–140, 2003.
- [59] Chuan Chen, Lixiang Li, Haipeng Peng, Yixian Yang, Ling Mi, and Hui Zhao. A new fixed-time stability theorem and its application to the fixed-time synchronization of neural networks. *Neural Networks*, 123:412–419, 2020.
- [60] Yu Kan, Jianquan Lu, Jianlong Qiu, and Jürgen Kurths. Exponential synchronization of time-varying delayed complex-valued neural networks under hybrid impulsive controllers. *Neural Networks*, 114:157–163, 2019.
- [61] Qian Tang and Jigui Jian. Matrix measure based exponential stabilization for complex-valued inertial neural networks with time-varying delays using impulsive control. *Neurocomputing*, 273:251–259, 2018.
- [62] Lulu Li, Xiaohong Shi, and Jinling Liang. Synchronization of impulsive coupled complex-valued neural networks with delay: The matrix measure method. *Neural Networks*, 117:285–294, 2019.

-
- [63] Dong Xie, Yueping Jiang, and Minghua Han. Global exponential synchronization of complex-valued neural networks with time delays via matrix measure method. *Neural Processing Letters*, 49(1):187–201, 2019.
 - [64] Weiqiang Gong, Jinling Liang, and Jinde Cao. Matrix measure method for global exponential stability of complex-valued recurrent neural networks with time-varying delays. *Neural Networks*, 70:81–89, 2015.
 - [65] Liangliang Li, Chuandong Li, and Hongfei Li. Fully state constraint impulsive control for non-autonomous delayed nonlinear dynamic systems. *Nonlinear Analysis: Hybrid Systems*, 29:383–394, 2018.
 - [66] Li Li, Zhen Wang, Yuxia Li, Hao Shen, and Junwei Lu. Hopf bifurcation analysis of a complex-valued neural network model with discrete and distributed delays. *Applied Mathematics and Computation*, 330:152–169, 2018.
 - [67] Weiqiang Gong, Jinling Liang, Congjun Zhang, and Jinde Cao. Nonlinear measure approach for the stability analysis of complex-valued neural networks. *Neural Processing Letters*, 44(2):539–554, 2016.
 - [68] Bo Zhou and Qiankun Song. Boundedness and complete stability of complex-valued neural networks with time delay. *IEEE Transactions on Neural Networks and Learning Systems*, 24(8):1227–1238, 2013.
 - [69] Wenbing Zhang, Yang Tang, Jian-An Fang, and Xiaotai Wu. Stability of delayed neural networks with time-varying impulses. *Neural Networks*, 36:59–63, 2012.
 - [70] Nan Wang, Xuechen Li, Jianquan Lu, and Fuad E Alsaadi. Unified synchronization criteria in an array of coupled neural networks with hybrid impulses. *Neural Networks*, 101:25–32, 2018.

-
- [71] Tao Fang and Jitao Sun. Stability of complex-valued impulsive and switching system and application to the lü system. *Nonlinear Analysis: Hybrid Systems*, 14:38–46, 2014.
- [72] Wenbing Zhang, Yang Tang, Xiaotai Wu, and Jian-An Fang. Synchronization of nonlinear dynamical networks with heterogeneous impulses. *IEEE Transactions on Circuits and Systems I: Regular Papers*, 61(4):1220–1228, 2013.
- [73] Yaqi Wang, Jianquan Lu, Jinling Liang, Jinde Cao, and Matjaž Perc. Pinning synchronization of nonlinear coupled lur’e networks under hybrid impulses. *IEEE Transactions on Circuits and Systems II: Express Briefs*, 66(3):432–436, 2018.
- [74] C Rajivganthi, Fathalla A Rihan, and Shanmugam Lakshmanan. Dissipativity analysis of complex-valued bam neural networks with time delay. *Neural Computing and Applications*, 31:127–137, 2019.
- [75] Xiaodi Li and Martin Bohner. An impulsive delay differential inequality and applications. *Computers & Mathematics with Applications*, 64(6):1875–1881, 2012.
- [76] Wangli He and Jinde Cao. Exponential synchronization of chaotic neural networks: a matrix measure approach. *Nonlinear Dynamics*, 55(1-2):55–65, 2009.
- [77] Cristina Flaut. Some remarks regarding quaternions and octonions. *arXiv preprint arXiv:1711.10434*, 2017.
- [78] Lyes Saad Saoud and Reza Ghorbani. Metacognitive octonion-valued neural networks as they relate to time series analysis. *IEEE Transactions on Neural Networks and Learning Systems*, 31(2):539–548, 2019.

-
- [79] C. A. Popa. Octonion-valued neural networks. *International Conference on Artificial Neural Networks*, 2016.
- [80] K. Takahashi, M. Fujita, and M. Hashimoto. Remarks on octonion-valued neural networks with application to robot manipulator control. In *2021 IEEE International Conference on Mechatronics (ICM)*, pages 1–6. IEEE, 2021.
- [81] Bo Liu, Wenlian Lu, and Tianping Chen. Generalized halanay inequalities and their applications to neural networks with unbounded time-varying delays. *IEEE transactions on neural networks*, 22(9):1508–1513, 2011.
- [82] Michael A Cohen and Stephen Grossberg. Absolute stability of global pattern formation and parallel memory storage by competitive neural networks. *IEEE transactions on systems, man, and cybernetics*, (5):815–826, 1983.
- [83] Tingwen Huang, Chuandong Li, and Goong Chen. Stability of cohen–grossberg neural networks with unbounded distributed delays. *Chaos, Solitons & Fractals*, 34(3):992–996, 2007.
- [84] Chuangxia Huang and Jinde Cao. Convergence dynamics of stochastic cohen–grossberg neural networks with unbounded distributed delays. *IEEE Transactions on Neural Networks*, 22(4):561–572, 2011.
- [85] Ying Wan, Jinde Cao, Guanghui Wen, and Wenwu Yu. Robust fixed-time synchronization of delayed cohen–grossberg neural networks. *Neural Networks*, 73:86–94, 2016.
- [86] Zhang Chen. Complete synchronization for impulsive cohen–grossberg neural networks with delay under noise perturbation. *Chaos, Solitons & Fractals*, 42(3):1664–1669, 2009.

-
- [87] Jinde Cao and Jinling Liang. Boundedness and stability for cohen–grossberg neural network with time-varying delays. *Journal of Mathematical Analysis and Applications*, 296(2):665–685, 2004.
- [88] Xuanying Li, Xiaotong Li, and Cheng Hu. Some new results on stability and synchronization for delayed inertial neural networks based on non-reduced order method. *Neural Networks*, 96:91–100, 2017.
- [89] Siyu Han, Cheng Hu, Juan Yu, Haijun Jiang, and Shiping Wen. Stabilization of inertial cohen-grossberg neural networks with generalized delays: A direct analysis approach. *Chaos, Solitons & Fractals*, 142:110432, 2021.
- [90] Juan Yu, Cheng Hu, Haijun Jiang, and Leimin Wang. Exponential and adaptive synchronization of inertial complex-valued neural networks: A non-reduced order and non-separation approach. *Neural Networks*, 124:50–59, 2020.
- [91] Abdujelil Abdurahman, Haijun Jiang, and Zhidong Teng. Lag synchronization for cohen–grossberg neural networks with mixed time-delays via periodically intermittent control. *International Journal of Computer Mathematics*, 94(2):275–295, 2017.
- [92] Lingzhong Zhang, Yongqing Yang, and Fei Wang. Lag synchronization for fractional-order memristive neural networks via period intermittent control. *Nonlinear Dynamics*, 89(1):367–381, 2017.
- [93] Chuan Chen, Lixiang Li, Haipeng Peng, and Yixian Yang. Adaptive lag synchronization of memristive neural networks with mixed delays. *IEEE Access*, 6:40768–40777, 2018.

-
- [94] Shiping Wen, Zhigang Zeng, Tingwen Huang, Qinggang Meng, and Wei Yao. Lag synchronization of switched neural networks via neural activation function and applications in image encryption. *IEEE Transactions on Neural Networks and Learning Systems*, 26(7):1493–1502, 2015.
- [95] Xinsong Yang, Jinde Cao, Yao Long, and Weiguo Rui. Adaptive lag synchronization for competitive neural networks with mixed delays and uncertain hybrid perturbations. *IEEE Transactions on Neural Networks*, 21(10):1656–1667, 2010.
- [96] Vasile-Mihai Popov and Radu Georgescu. *Hyperstability of control systems*. Springer, 1973.
- [97] Sunny Singh, Umesh Kumar, Subir Das, and Jinde Cao. Global exponential stability of inertial cohen–grossberg neural networks with time-varying delays via feedback and adaptive control schemes: Non-reduction order approach. *Neural Processing Letters*, 55(4):4347–4363, 2023.
- [98] Hongjun Qiu and Fanchao Kong. Global exponential stability of inertial cohen–grossberg neural networks with parameter uncertainties and time-varying delays. *International journal of control*, 95(8):2126–2140, 2022.
- [99] Ke Liang and Li Wanli. Exponential synchronization in inertial cohen–grossberg neural networks with time delays. *Journal of the Franklin Institute*, 356(18):11285–11304, 2019.
- [100] Ruoyu Wei, Jinde Cao, Wenhua Qian, Changfeng Xue, and Xiaoshuai Ding. Finite-time and fixed-time stabilization of inertial memristive cohen–grossberg neural networks via non-reduced order method. *AIMS Mathematics*, 6(7):6915–6932, 2021.

-
- [101] Guodong Zhang, Junhao Hu, and Yi Shen. Exponential lag synchronization for delayed memristive recurrent neural networks. *Neurocomputing*, 154:86–93, 2015.
 - [102] Changqing Long and Guodong Zhang. Chaotic lag synchronization of a class of inertial neural networks with unbounded distributed delays. In *2020 Chinese Control And Decision Conference (CCDC)*, pages 5386–5391. IEEE, 2020.
 - [103] Jichen Shi and Zhigang Zeng. Global exponential stabilization and lag synchronization control of inertial neural networks with time delays. *Neural Networks*, 126:11–20, 2020.

List of Publications

1. **Umesh Kumar**, Subir Das, Chuangxia Huang and Jinde Cao. "Fixed-time synchronization of quaternion-valued neural networks with time-varying delay", *Proceedings of the Royal Society A*, 476(2241), 2020.
2. Rakesh Kumar, **Umesh Kumar**, Subir Das, Jianlong Qiu, Jianquan Lu. "Effects of heterogeneous impulses on synchronization of complex-valued neural networks with mixed time-varying delays", *Information Sciences*, 551 (228–244), 2021.
3. **Umesh Kumar**, Sunny Singh, Subir Das. "Global exponential stability of neural networks with time-varying delays via matrix measure method", *Communicated*.
4. Sunny Singh, **Umesh Kumar**, Subir Das and Jinde Cao. "Exponential and adaptive chaotic lag synchronization of inertial Cohen-Grossberg neural networks with discrete and unbounded distributed delays", *Communicated*.
5. Sunny Singh, **Umesh Kumar**, Subir Das, F. Alsaadi and Jinde Cao. "Synchronization of quaternion valued neural networks with mixed time delays using Lyapunov function method", *Neural Processing Letters*, (1–17), 2022.
6. Sunny Singh, **Umesh Kumar**, Subir Das and Jinde Cao. "Global Exponential Stability of Inertial Cohen–Grossberg Neural Networks with Time-Varying Delays

via Feedback and Adaptive Control Schemes: Non-reduction Order Approach”, *Neural Processing Letters*, (1–17), 2022.

7. Shiv Shankar Chouhan, **Umesh Kumar**, Subir Das and Jinde Cao. ”Fixed time synchronization of octonion valued neural networks with time varying delays”, *Engineering Applications of Artificial Intelligence*, 118 (105684), 2023.