Fixed-Time Stabilization of Multi-Weighted Complex Networks via Novel Adaptive Pinning Chatter-Free Control and Its Applications

1st Fangmin Ren
Huazhong University of Science and Technology
Wuhan, China
fangmren@126.com

2nd Xiaoping Wang
Huazhong University of Science and Technology
Wuhan, China
wangxiaoping@hust.edu.cn

3rd Yangmin Li
The Hong Kong Polytechnic University
Hongkong, China
yangmin.li@polyu.edu.hk

4th Zhanfei Chen
Huazhong University of Science and Technology
Wuhan, China
chenzhanfei@hust.edu.cn

5th Chen Wei
Huazhong University of Science and Technology
Wuhan, China
weichen8321@163.com

6th Zhigang Zeng
Huazhong University of Science and Technology
Wuhan, China
zgzeng@hust.edu.cn

***Abstract*—In this contribution, the problem of fixed-time stabilization in multi-weighted complex networks via the novel adaptive pinning nonchattering control based on the linear matrix inequality (LMI) method, as well as its application to image protection is addressed. Different from the traditional methods, a novel fixed-time stable form is proposed and the convergence time is estimated based on beta function. Next, utilizing the designed continuous adaptive control strategy, a sufficient LMI condition is presented to ensure the fixed-time stabilization of multi-weighted complex networks. Furthermore, the novel nonchattering adaptive pinning control protocol is given to guarantee the fixed-time stabilization of the system only by controlling a small number of nodes. Note that a scheme of how to select the number of control nodes is put forward accordingly. Finally, the effectiveness of the proposed method is verified by the actual financial model. Meanwhile, a number of encryption experiments are carried out based on three networks, and the mean and variance of the encryption performance are calculated to show the stability and robustness of image encryption different from the existing research works.**

***Index Terms*—Fixed-time stabilization, adaptive pinning control, chatter-free, image protection.**

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