Call for Papers

SPECIAL ISSUE ON TYPE-2 FUZZY-MODEL-BASED CONTROL AND ITS APPLICATIONS

(DEADLINE FOR SUBMISSIONS 1 FEBRUARY 2020)

I. AIM AND SCOPE

Nonlinear systems are difficult to analyze and control due to their intrinsic complexity. During the past decades, Fuzzy-Model-Based (FMB) control strategy has been recognized as one of the most effective control approaches for nonlinear systems. Takagi–Sugeno (T–S) fuzzy model plays an important role in FMB control systems and it has demonstrated a wide range of successful industrial applications. Thanks to its rigorous mathematical foundation, the stability analysis and control synthesis of T-S FMB control systems can be conducted in a systematic way. Prof. Kazuo Tanaka has made pioneering significant contribution to investigate the stability issues of T-S FMB control systems and relaxed the stability conditions by proposing the well-known parallel distributed compensation (PDC) method, which is the most popular method adopted to deal with (type-1) T-S FMB control systems.

Considering the ability of dealing with uncertainty directly, the importance and development of type-2 fuzzy sets and theory have been highly noticed and promoted by Prof. Jerry M. Mendel. Many researchers have devoted to contributing to the field of type-2 fuzzy set and its control applications. Just name a few, Prof. Jerry M. Mendel and Prof. Robert I. Bob John made significant contribution to advertise the necessity of (interval) type-2 fuzzy set; Prof. Dongrui Wu and Prof. Jerry M. Mendel developed the enhanced Karnik-Mendel algorithms for type-reduction; Prof. Woei Wan Tan utilized type-2 fuzzy logic to design the practical controllers; Prof. Tufan Kumbasar and Prof. Hani Hagras successfully applied the type-2 fuzzy set in control of mobile robots subject to uncertainty.

Introducing type-2 fuzzy sets into control strategies is a promising way to push the FMB control techniques to a new frontier. Beginning with the first attempt on the stability analysis and control synthesis of (interval) type-2 FMB control system by Dr. H.K. Lam in 2008 (Lam, H.K. and Seneviratne, L.D., 2008. Stability analysis of interval type-2 fuzzy-model-based control systems. IEEE Transactions on Systems, Man, and Cybernetics, Part B (Cybernetics), 38(3), pp.617-628), recently, the research on interval type-2 FMB control systems has drawn the attention of researchers. It is also worth mentioning that Prof. William Melek and Prof. Hao Ying have contributed excellent research works to the type-2 T-S/TSK FMB control field. Nonlinearity and uncertainty are generally considered as challenging components to be addressed during the system analysis and control design. The merit of type-2 FMB control techniques is to deal with nonlinearity/uncertainty in the system through type-2 fuzzy sets. Recent research outcomes of type-2 FMB have verified that type-2 FMB control strategy can be successfully applied to real-world nonlinear systems subject to uncertainty. Although there were already some seminal works on type-2 FMB control systems that can be found in the literature, there are still many interesting related topics await.

The potential research topics for type-2 FMB control systems can be the relaxation of stability/stabilization conditions, control methodologies, design of robust type-2 fuzzy controller, performance realization of type-2 fuzzy controller, applications of type-2 fuzzy control theory, etc. Inspired by the great research potential of type-2 FMB control systems, we believe that further efforts are worth to be devoted into these areas, which can promote the development of type-2 FMB control research and take it into next level.

This special issue is to serve as a vehicle to promote some focused frontier topics in the field of type-2 FMB control systems. A collection of high-quality type-2 fuzzy control related papers in a special issue will lead to the long-term impact that the accepted papers will serve as an indicator of the most influential topics, highlight the
unique advantages of type-2 fuzzy control techniques, and provide reference and driving force in support of the research development.

II. TOPIC

The topics cover a broad range of research on the control issues of type-2 fuzzy logic systems. The solicited contributions involve the following applications (but not limited to):

- Membership-function-dependent (MFD) analysis;
- Type-2 fuzzy modeling;
- Design of robust type-2 controller subject to the external disturbance;
- Combination of type-2 fuzzy logic to polynomial FMB control systems;
- Model reduction of type-2 FMB control systems;
- New type-reduction methods of type-2 membership functions in FMB control systems;
- Adaptive control of type-2 FMB systems;
- Optimal control of type-2 FMB systems;
- Stability/performance/robustness analysis of type-2 FMB control systems
- Type-2 fuzzy neural-network control systems;
- Networked type-2 FMB control systems;
- Industrial applications of type-2 fuzzy systems.

Advanced type-2 methods involve the following technologies (but not limited to):

- Type-2 FMB control with reinforcement learning;
- Type-2 FMB control with medical robotics;
- Type-2 FMB control with mobile robots;
- Type-2 FMB control of bio-systems;
- Type-2 FMB control of continuum robotic manipulator;
- Type-2 FMB control with bio-inspired robotics;
- Type-2 FMB control with evolutionary algorithms;
- Type-2 FMB control with machine learning;
- Type-2 FMB control with visual servo.

III. SUBMISSION GUIDELINES

All authors should read ‘Information for Authors’ before submitting a manuscript at https://cis.ieee.org/publications/t-fuzzy-systems/tfs-information-for-authors
Submissions should be through the IEEE TFS journal website http://mc.manuscriptcentral.com/tfs-ieee.
Submissions should also be in the correct format https://journals.ieeeauthorcenter.ieee.org/create-your-ieee-journal-article/authoring-tools-and-templates/ieee-article-templates/templates-for-transactions/
It is essential that your manuscript is identified as a Special Issue contribution:
- Ensure you choose ‘Special Issue’ when submitting.
- A cover letter must be included which includes the title ‘Special Issue on Type-2 Fuzzy-Model-Based Control and its Applications’

IV. IMPORTANT DATES

1 February 2020 – submission deadline
April 2020 – notification of the first-round review (for guidance)
May 2020 – revised submission due
July 2020 – final notification of acceptance/rejection

V. GUEST EDITORS

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