

Open invited track

IFAC 2020 World Congress, Berlin, Germany, July 12 – 17, 2020

“Non-asymptotic estimation: algorithms and applications”

Taous Meriem Laleg-Kirati¹, Johann Reger², Jerome Jouffroy³, Da-Yan Liu⁴, Ali Zemouche⁵

Abstract:

This open invited track is proposed for inclusion in the IFAC world congress 2020 to be held in Berlin, Germany, July 12-17, 2020. This open invited track invites contributions to non-asymptotic estimation algorithms and their applications, aims at presenting recent advances in this field and gives a forum to discuss tentative future directions.

Description:

Estimation problems are ubiquitous in control and monitoring of dynamical systems. The most popular approach for the estimation of states is state observers such as the well-known Luenberger observer. Typically, an observer uses a copy of the system model, augmented with an output injection term the gain of which is obtained by ensuring the asymptotic convergence of the state estimation error to zero when time tends to infinity. However, in many situations, convergence of the state in finite time is favorable. Several finite-time convergence estimation algorithms have been proposed for various classes of systems, including linear and nonlinear dynamical systems, distributed parameter systems such as partial differential equations and fractional order systems. Examples of pertinent algorithms are finite-time convergent observers, such as higher order sliding mode observers, algebraic methods and modulating functions approaches.

The following approaches can be considered in the non-asymptotic estimation category:

- Interval observers
- Finite-time convergence in the sense of practical stability
- Prescribed time convergence
- Methods based on direct computation of the solution
- Volterra integral transformation and modulating functions

The objective of this open invited track is to present the recent advances and to discuss the current challenges in finite time estimation algorithms and their applications.

¹ Computer, Electrical and Mathematical science and engineering division, King Abdullah University of Science and Technology (KAUST), Thuwal, KSA

² Department of Computer Science and Automation, Technische Universität Ilmenau, Ilmenau, Germany

³ The Mads Clausen Institute SDU Mechatronics, Denmark

⁴ INSA Centre Val de Loire - France

⁵ CRAN UMR 7039, IUT de Longwy - Université de Lorraine, France.