A Data-driven Sigmoid-based Secretion Rate of Neuroendocrine-PID Control for TRMS System

Mohd Riduwan Ghazali, Mohd Ashraf Ahmad and Haszuraidah Ishak

Faculty of Electrical and Electronics Engineering Technology
Universiti Malaysia Pahang
26600, Pekan, Pahang, Malaysia
riduwan@ump.edu.my

Abstract:
This paper investigated the implementation of datadriven sigmoid-based secretion rate of neuroendocrine-PID (SbSR-NEPID) within a twin-rotor MIMO system (TRMS), based on the adaptive safe experimentation dynamics (ASED) algorithm. In essence, SbSR-NEPID is developed as a human body-inspired mechanism that promotes accurate and efficient controller structure. The ASED approach was then employed for parameter tuning of the proposed controller, following its role as the data-driven control scheme that tracks error and input control performances. Fundamentally, such game-theoretic approach would seek optimal parameters through random perturbations of several elements from its controller's parameters. Its application in tracking both performance and computational interval have also gained vast explorations above statistical ground. As such, results obtained from the simulation has demonstrated data-driven SbSR-NEPID control based on the ASED method as a capable approach in tracking the assigned trajectory missions, while yielding exceptional control accuracy beyond the requirement of theoretical assumptions on the plant dynamics.

Keywords: Data-driven control; neuroendocrine-PID; optimization; control system; TRMS

Acknowledgement

The current academic accomplishment is attributed to the benevolent support under the internal grant RDU190325 by Universiti Malaysia Pahang.