

Synchronous-Asynchronous Simulated Kalman Filter Algorithm with Random Switching

Zuwairie Ibrahim 1,*, Nor Azlina Ab. Aziz 2, Marizan Mubin 3, Norrima Mokhtar 3

1 College of Engineering, Universiti Malaysia Pahang, Pahang, Malaysia

2 Multimedia University, Melaka, Malaysia

3 Faculty of Engineering, Universiti Malaya, Kuala Lumpur, Malaysia

*Corresponding Author: zuwairie@ump.edu.my

Abstract:

The original Simulated Kalman Filter (SKF) is an optimizer that employs synchronous update mechanism. The agents in SKF update their solutions after all fitness calculations, prediction process, and measurement process are completed. An alternative to synchronous update is asynchronous update. In asynchronous update, only one agent does fitness calculation, prediction, measurement, and estimation processes at one time. A recent study shows that the asynchronous SKF outperforms synchronous SKF. In this study, synchronous and asynchronous mechanisms are combined in SKF. At first, the SKF starts with synchronous update. If no improved solution is found, the SKF changes its update mechanism. The decision to switch from synchronous to asynchronous or vice versa is made randomly. Using the CEC2014 benchmark test suite, experimental results indicate that the proposed synchronous-asynchronous SKF with random switching outperforms the asynchronous SKF including the synchronous SKF as well.

Keywords: Simulated Kalman Filter; Synchronous; Asynchronous

Acknowledgment

This research is financially supported by a fundamental research grant scheme (FRGS/1/2017/ICT05/UMP/02/1) which is awarded by the Ministry of Higher Education of Malaysia to Universiti Malaysia Pahang (UMP).