Ann. Acad. Rom. Sci.
Ser. Math. Appl.
ISSN 2066-6594 Vol. 13, No. 1-2/2021

RESILIENT HYBRID-TRIGGERED CONTROL FOR NETWORKED STOCHASTIC SYSTEMS UNDER DENIAL-OF-SERVICE ATTACKS*

Ning Zhao† Huiyan Zhang‡ Peng Shi§

DOI https://doi.org/10.56082/annalsarscimath.2021.1-2.122

Abstract

This paper investigates the stabilization problem for stochastic networked control systems under periodic denial-of-service (DoS) jamming attacks. First, the resilient hybrid-triggered communication scheme is developed to reduce the network transmission data and improve the utilization efficiency, where a Bernoulli distribution is used to characterize the switching protocol between time-triggered scheme and event-triggered scheme. Then, a resilient hybrid-driven control protocol is designed, and a new switched stochastic system is constructed. Sufficient conditions of the mean-square exponential stability are derived for the underlying system under DoS attacks. Furthermore, a co-design scheme of the feedback gain and the hybrid-triggering parameter is obtained by solving linear matrix inequalities. Finally, a satellite control system is employed to illustrate the virtue and applicability of the proposed approach.

MSC: 60H35

*Accepted for publication in revised form on December 9-th, 2020

†zhaoning@hrbeu.edu.cn College of Intelligent Systems Science and Engineering, Harbin Engineering University, Harbin 150001, Heilongjiang, China

‡huiyanzhang@ctbu.edu.cn National Research Base of Intelligent Manufacturing Service, Chongqing Technology and Business University, Chongqing 400067 (Corresponding author.)

§peng.shi@adelaide.edu.au School of Electrical and Electronic Engineering, University of Adelaide, SA 5005, Australia