Health aware control of feedback systems with application to predictive maintenance

Yufei Gong[1], Khac Tuan Huynh , Yves Langeron*[2], and Grall Antoine[1]

[1]Université de Technologie de Troyes – Troyes University of Technology, Computer Science and Digital Society (LIST3N) – France

[2]Université de Technologie de Troyes – Troyes University of Technology, Computer Science and Digital Society (LIST3N) – France

Résumé

This work addresses perspectives outlined in our paper presented at the first SAGIP conference in 2023. In summary, we examine a SISO feedback control system (FCS) whose physical structure is unknown, where the actuator is subject to stochastic hidden damage. This research focused on the prognosis of this FCS remaining useful life (RUL).

In this paper, the way RUL is achieved is here briefly recalled. Health-aware control has become an important topic of interest over the years, as evidenced in the literature.Two main objectives are considered. The first one is to integrate the remaining useful life of FCS into controller reconfiguration to manage system lifetime while accounting for its performance. The second objective is to leverage reconfiguration as an additional action within the framework of a predictive maintenance policy.
Combined with a classic periodic predictive maintenance policy, health aware control reveals its potential to more minimize long-term maintenance cost. Looking forward, exploring aperiodic maintenance policies based on such control could be envisaged for planning missions with various durations.

*Intervenant