Model-free state feedback controller tuning for a liquid slosh suppression system

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ABSTRACT
This paper presents a model-free tuning of a data-driven pole placement state feedback controller for a liquid slosh suppression system. The optimum parameter gains of the state feedback controller are derived utilizing a set of initial input and output data recorded from the discrete-time system. To overcome the existence of the large steady state error when only the state feedback controller was applied, an integral control is added to compensate for such signal. The feasibility of proposed method is illustrated through numerical simulation by comparison with the conventional approach of designing the state feedback controller. The performance of system is investigated based on transient response positioning movement of the cart container, and the level of slosh reduction in the liquid. © 2022, The Author(s)

ACKNOWLEDGEMENT