Adaptive fractional order sliding mode control for Boost converter in the Battery/Supercapacitor HESS

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Abstract

In this paper, an adaptive fractional order sliding mode control (AFSMC) scheme is designed for the current tracking control of the Boost-type converter in a Battery/Supercapacitor hybrid energy storage system (HESS). In order to stabilize the current, the adaptation rules based on state-observer and Lyapunov function are being designed. A fractional order sliding surface function is defined based on the tracking current error and adaptative rules. Furthermore, through fractional order analysis, the stability of the fractional order control system is proven, and the value of the fractional order (λ) is being investigated. In addition, the effectiveness of the proposed AFSMC strategy is being verified by numerical simulations. The advantages of good transient response and robustness to uncertainy are being indicated by this design, when compared with a conventional integer order sliding mode control system.

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Protocol

Step 1.
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Step 2.
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