

Robust fractional-order proportional-integral controller tuning for load frequency control of a microgrid system with communication delay

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Abstract

The integration of renewable energy resources and uncertainties in power system models pose significant challenges to load frequency control (LFC). To tackle these challenges, controller tuning with robustness constraints provides an efficient solution. In this paper, we propose a novel approach for controller tuning in LFC of microgrid systems with communication delay. Our approach converts the tuning task into an algorithm that solves two parametric equations subject to robustness constraints, resulting in high accuracy and computational efficiency. We use a perturbed scenario with uncertain microgrid model gains and communication delay to illustrate the tuning efficiency. Simulation examples, including comparisons with classical tuning methods, demonstrate the effectiveness of our proposed method.

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