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Comparison and Practical Aspects of Two Approaches for Online Load Reconstruction

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The load reconstruction process is actually to solve an ill-posed inverse problem in structural dynamics. The recursive three-step filter (RTSF) and the Kalman filter with unknown inputs (KF-UI), two algorithms recently proposed in electrical engineering, both can simultaneously deliver the optimal estimates of the system states and the unknown inputs, without any assumption on the input dynamics. This unknown input estimation ability and the inherent real-time operation possibility make these two types of estimators very promising for online load reconstruction.

In this paper, both the RTSF and the KF-UI are first generalized to be compatible with the case that the process noise and the measurement noise are correlated. Then the reconstruction performance of the generalized RTSF (G-RTSF) and the generalized KF-UI (G-KF-UI) are evaluated using both simulations and experiments.

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Ключевые слова:

Содержание

Abstract

Introduction

Common filter form of the RTFS and the KF-UI

Common filter form of the G-RTFS and the G-KF-UI

Reconstruction performance evaluation

Conclusions

Acknowledgements