

Robust State Estimation for Distribution Systems via Graph Signal Processing

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This paper addresses the challenges of accurate state estimation in distribution grids, particularly the issues of sparse measurements and outliers in modern systems. A robust state estimation method is proposed, utilizing graph signal processing (GSP). By incorporating constraint terms, first- and second-order Graph Low-Frequency Measurements are derived, which exhibit low-pass characteristics and enhance state estimation accuracy. Additionally, a sliding-window-based outlier measurement identification technique is introduced, effectively identifying and mitigating the impact of outlier data. Extensive testing demonstrates the effectiveness of the proposed method in improving both state estimation accuracy and outlier detection performance.