

Output-Only And Real-Time Structural Health Monitoring

Marios IMPRAIMAKIS, Andrew SMYTH

Real time dynamic system monitoring has been an active area of research for more than a half century motivated by goals of identification, damage detection, and prognosis of system behavior. Many approaches, however, require the input which is not always available. Specifically, it may be impossible to know the input or, alternately, the measurement of the input is much more unreliable than the dynamic state measurement. Here, the input-parameter-state estimation capabilities of a new Kalman filter are examined herein for both complete and limited output information conditions. This output-only methodology allows for a better understanding of the system compared to the standard output-only parameter identification strategies, while applications include incomplete-data-driven structural health monitoring, damage detection, and condition assessment with respect to Bayesian inference and uncertainty quantification.