

Dynamical Models for Environmental Effect Depuration for Structural Health Monitoring of Bridges

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Abstract : This research aims to enhance bridge monitoring by employing innovative techniques that incorporate exogenous factors into the modeling of sensor signals, thereby improving long-term predictability beyond traditional static methods. Using real datasets from two different bridges equipped with Linear Variable Displacement Transducer (LVDT) sensors, the study investigates the fundamental principles governing sensor behavior for more precise long-term forecasts. Additionally, the research evaluates performance on noisy and synthetically damaged data, proposing a residual-based alarm system to detect anomalies in the bridge. In summary, this novel approach combines advanced modeling, exogenous factors, and anomaly detection to extend prediction horizons and improve preemptive damage recognition, significantly advancing structural health monitoring practices.

Keywords : structural health monitoring, dynamic models, windy, railway bridges

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