Session 3: Identification and Fault Detection
09:40 – 10:00, 15th, July

Output-only Fault Detection in Structural Engineering based on Kernel PCA
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Structural health monitoring relies on the repeated observation of damage-sensitive features such as natural frequencies. A major problem is that regular changes in temperature, operational loading, etc., also influence those features. These influences are in general nonlinear and they affect different features in a different way. An improved technique based on kernel principal component analysis has been developed for eliminating these influences. The technique is output-only, which implies that only the damage-sensitive features need to be measured, not the environmental parameters. A nonlinear output-only model is implicitly identified by fitting it to training data in undamaged condition. Afterwards, the structure is monitored by comparing the model predictions with the observed features. The technique is validated with natural frequency data from a three-span prestressed concrete bridge, which was progressively damaged at the end of a one-year monitoring period.