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Bayesian operational modal analysis of a long-span cable-stayed sea-crossing bridge

Key words:

Cable-stayed sea-crossing bridge;

Operational modal analysis;

Bayesian modal identification;

EM algorithm.

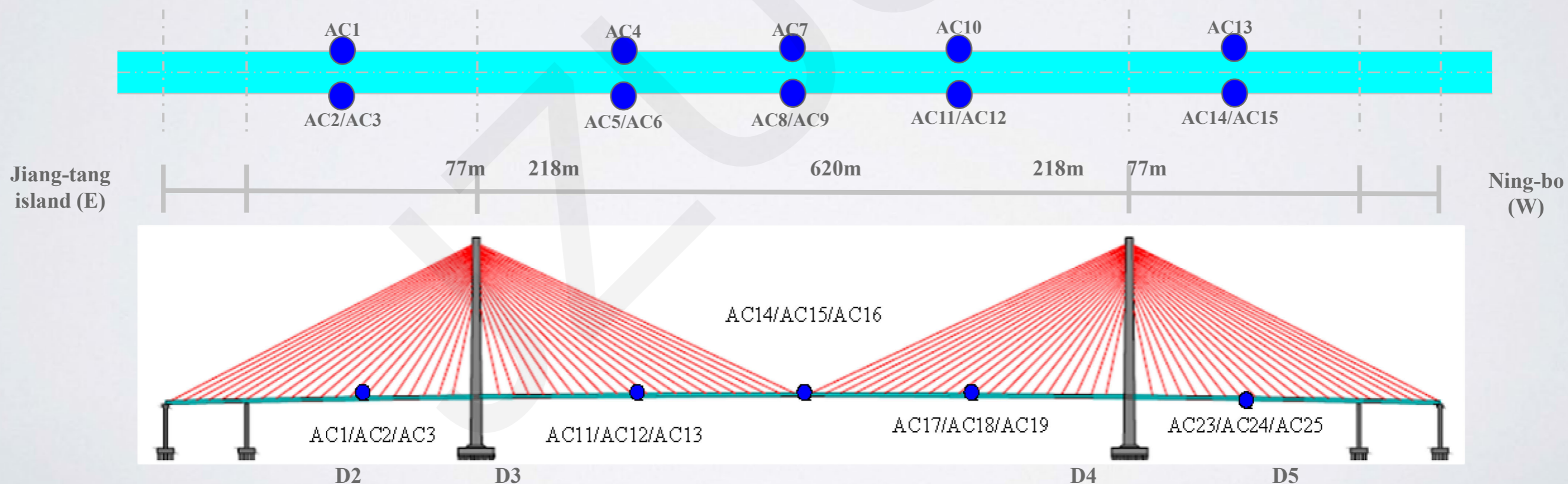


Bridge description

- Connects the Jin-tang island and city of Ning-bo, China.
- Three-span cable-stayed bridge.
- Total length of 18.415 km.
- 218m (side span) + 620m (main span) + 218m (side span).
- Steel-box girder 30.1 m in width.
- Reinforced concrete pylons, 204 m in height.

Testing information

- 15 uniaxial piezoelectric sensors (ASP series, KYOWA).
- Sensitivity of $100 \text{ mV/g} \pm 10\%$.
- Data acquisition system of UCAM series.
- Sampling rate of 50 Hz.
- 24 hrs data collection on 13th July 2013.



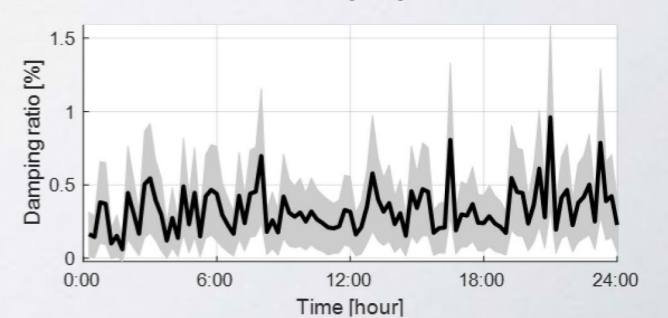
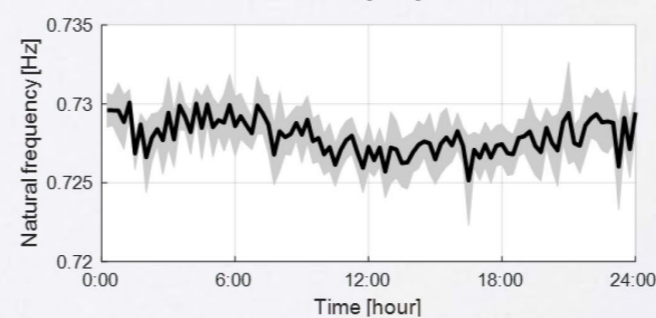
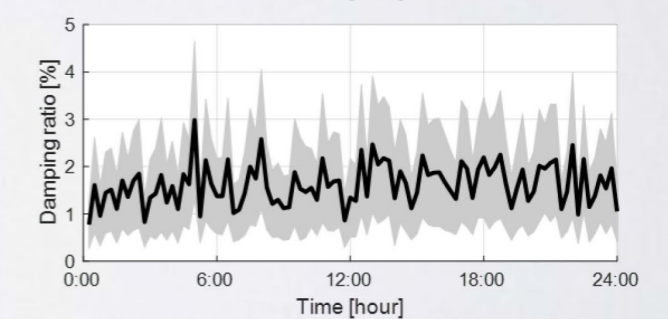
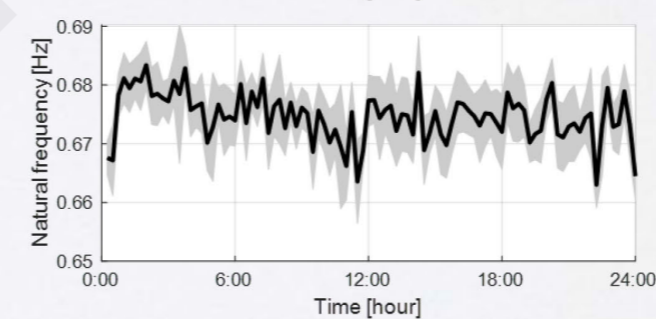
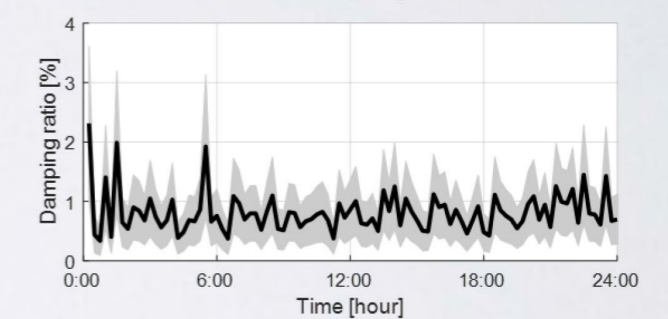
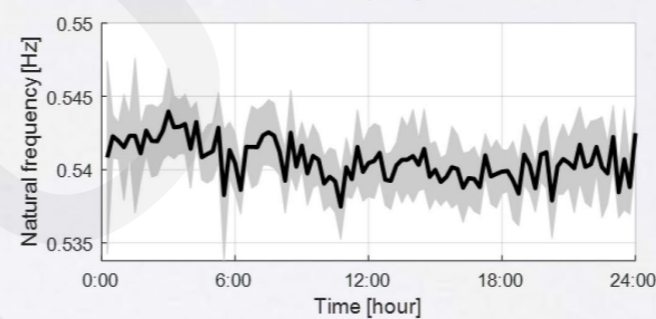
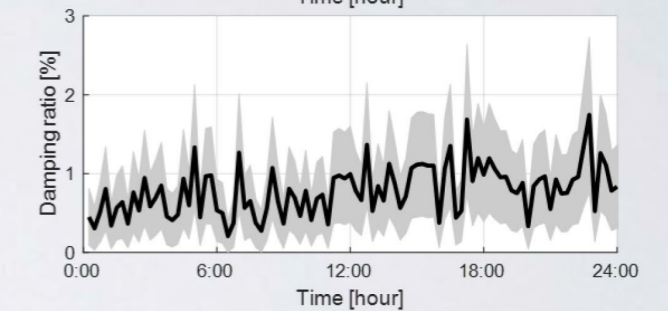
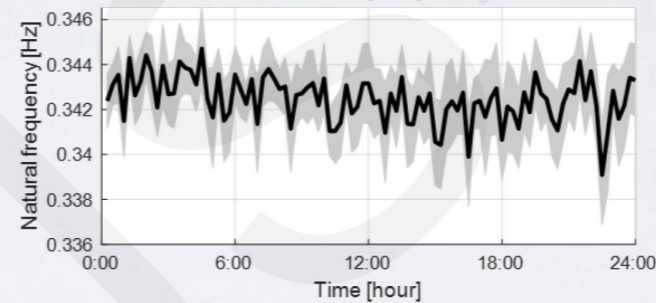
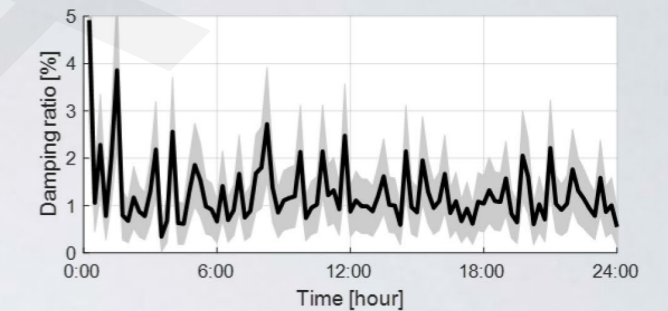
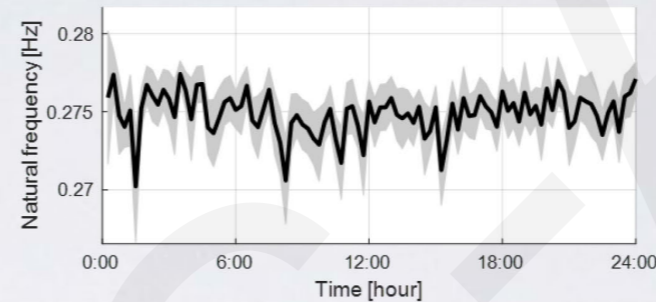
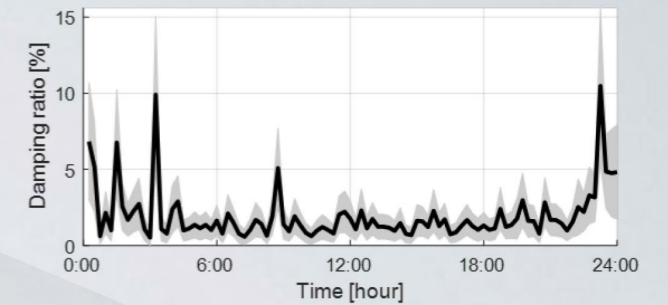
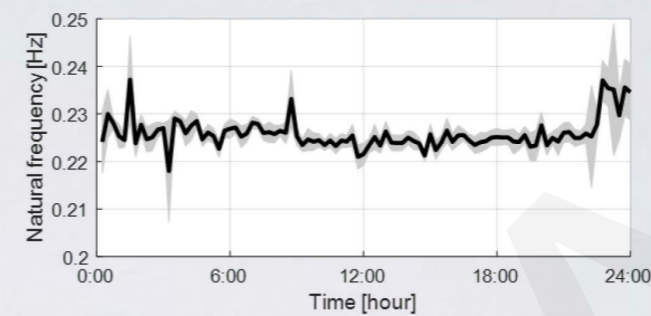


Bayesian FFT incorporating EM algorithm

- Bayesian inference
- Most Probable Value of modal parameters
- Posterior Uncertainty
- Fast EM computation algorithm

Identified natural frequencies & damping ratios

- 15 mins time window
- Bold line: MPVs
- Grey areas: standard derivation





Global mode shapes

