Journal of Zhejiang University-SCIENCE A

Cite this as: Yan-long Xie, Binbin Li, Jian Guo, 2020. Bayesian operational modal analysis of a long-span cable-stayed sea-crossing bridge. *Journal of Zhejiang University-SCIENCE A (Applied Physics & Engineering)*, 21(7):553-564.
https://doi.org/10.1631/jzus.A1900511

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.

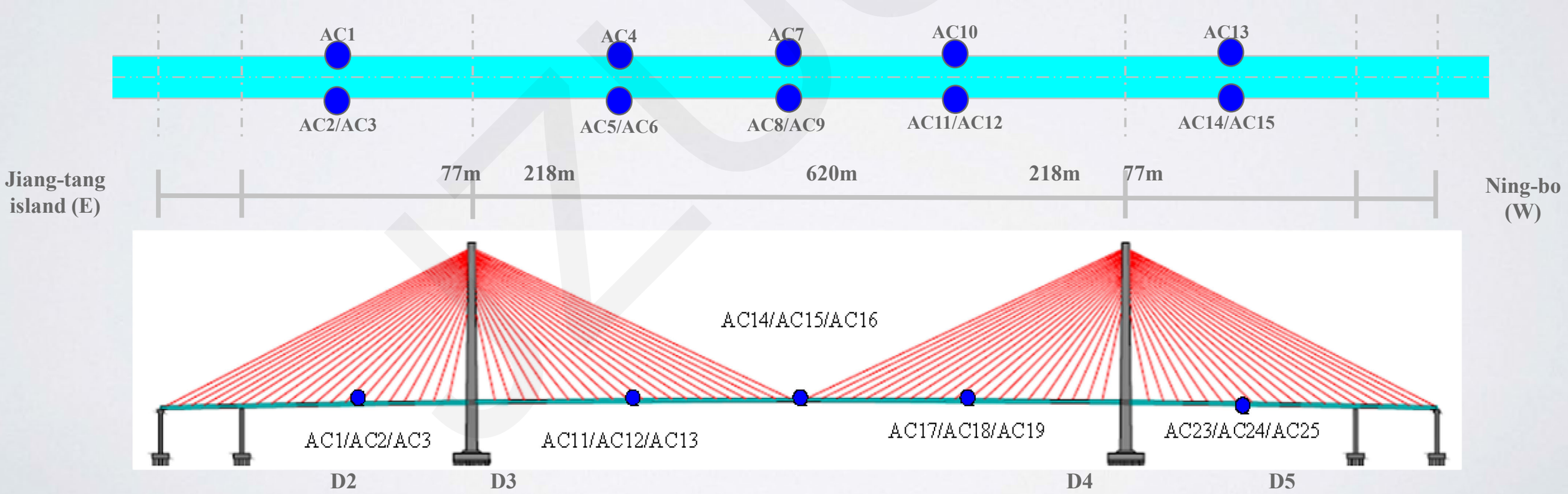


Bridge description

- 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 mV/g ± 10%.
- Data acquisition system of UCAM series.
- Sampling rate of 50 Hz.
- 24 hrs data collection on 13th July 2013.



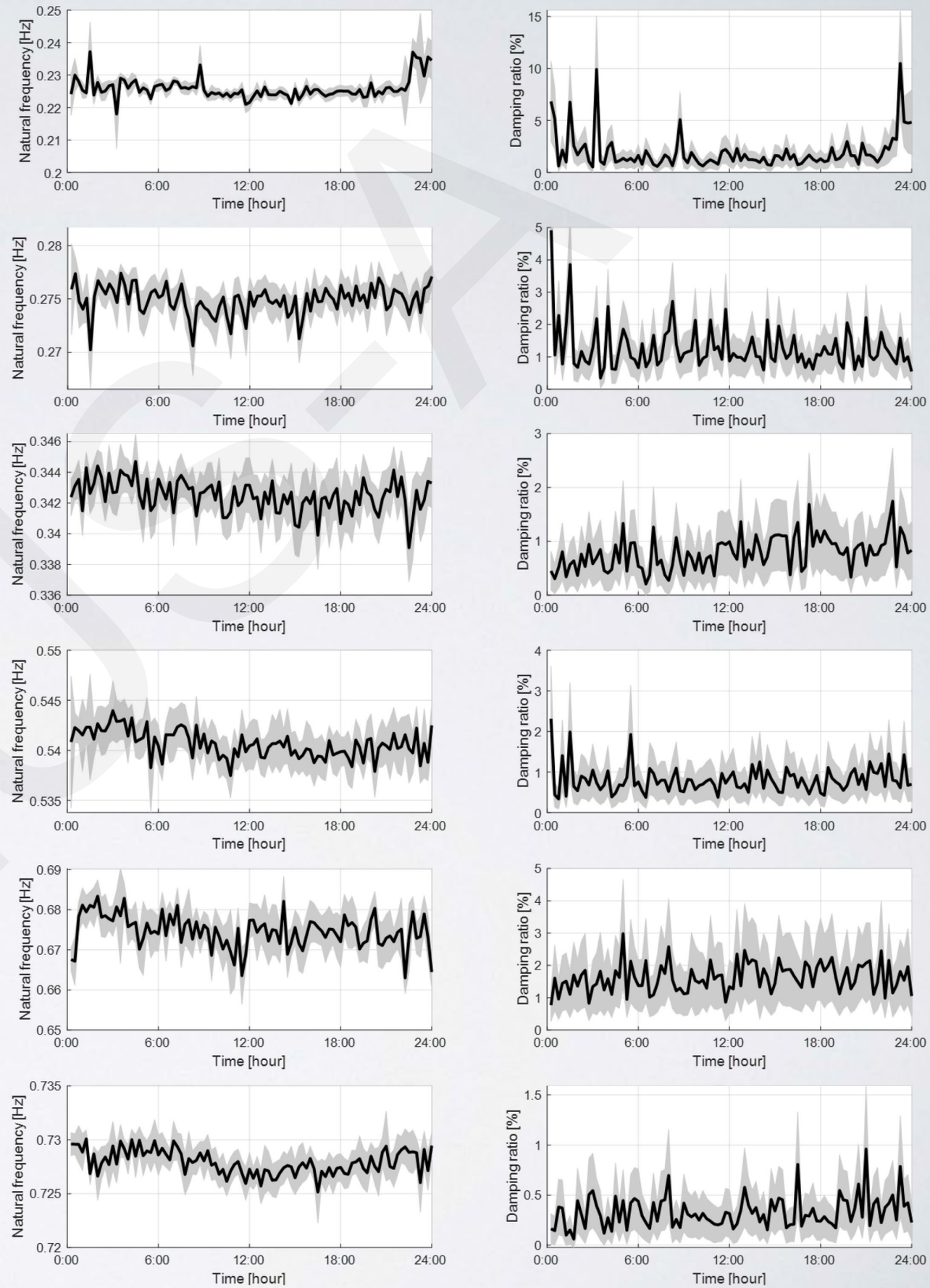
Bayesian FFT incorporating EM algorithm

- 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



Journal of Zhejiang University-SCIENCE A



Global mode shapes

