Workshop on
Dynamics of FRP Structures

22 June 2018
University of Warwick

Stana Živanović

Welcome

Some general info:

- Room: fire exits (no fire alarm planned)
- Photos
- Coffee/biscuits available at the lounge at any time – help yourselves

Project aim

Project no EP/M021505/1:
Characterising dynamic performance of fibre reinforced polymer structures for resilience and sustainability

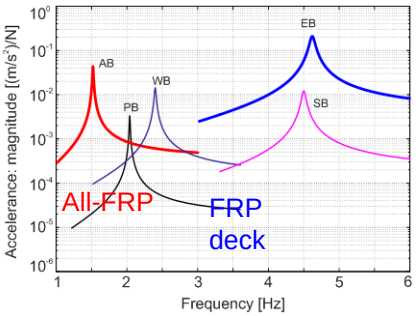
Funder:
EPSRC

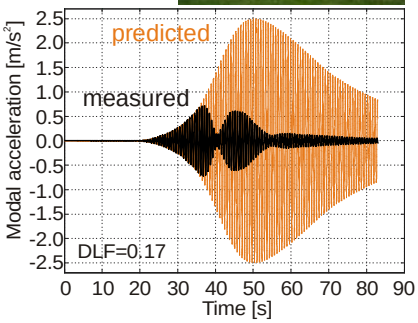
Test **full-scale FRP structures** (footbridges) to:

- Determine dynamic properties:
  - natural frequencies
  - damping ratios
  - modal masses and
  - mode shapes of relevant vibration modes.
- Evaluate vibration performance under relevant dynamic loading:
  - mainly humans and
  - train passages.

Project motivation

- Lack of design guidance on dynamic behaviour
- Apparent liveliness of the FRP structures





Project team at Warwick University

Project no EP/M021505/1:
Characterising dynamic performance of fibre reinforced polymer structures for resilience and sustainability

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Dr Stana Živanović
Principal-Investigator
Vibration servicebaility and human-induced loading

Prof. Toby Mottram
Co-Investigator
Fibre reinforced polymer shapes and systems

Dr Xiaojun Wei
Post-doctoral researcher
Modal testing
Vibration measurements
Equipment

Dr Justin Russell
Post-doctoral researcher
Numerical modelling
Design of FRP bridge
Project logistics

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Guest speaker

Dr Lee Canning, Jacobs
Principal Engineer & Team Leader
FRP composite technology in bridge engineering

Collaborators

JACOBS
UNIVERSITY OF EXETER
NetworkRail
Empa
I U A V
Optima Projects Ltd
LarkfleetHomes
MONASH University
Pipex px
TUDelft
UNIVERSITY OF BELGRADE

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Programme

Part I: FRP Structures	
10:00 - 10:25	FRPs in Structural Engineering – Rise to Prominence and Design Guidelines
10:25 – 10:50	A Designer's View: Challenges in Design against Dynamic Loading
10:50 – 11:15	FE Modelling of FRP Structures: Influence of Uncertainties
11:15 – 11:45 Coffee break	
Part II: Field and Lab Work	
11:45 – 12:10	Dynamics of FRP Bridges: Testing and Modal Properties
12:10 – 12:35	Warwick FRP Bridge: Design and Performance
12:35 – 13:30 Lunch	
13:30 – 15:00	Laboratory Visit and Demos on FRP bridge
Part III: Vibration Serviceability: Challenges and Way Forward	
15:00 – 15:25	Vibration Effects due to Train Buffeting
15:25 – 15:50	Vibration Response to Human-Induced Dynamic Loading
15:50 – 16:30	Discussion

20 min per presentation; 5min questions/change-over

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Main achievements

Eight full-scale footbridges tested








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Main achievements

A lively all-FRP lab bridge designed and built (Jun 2018)

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Aim of the workshop

- Share insight into dynamic properties of FRP structures (and how they compare with those of structures made of traditional constructions materials)
- Discuss vibration serviceability challenges (and potential ways of addressing them)
- Visit and experience a new laboratory FRP bridge (for human-structure interaction studies)
- Share views and experiences of FRP composites in structural engineering

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Project webpage

Will be updated in due course – not all data have been analysed

https://warwick.ac.uk/fac/sci/eng/frpdynamics/

We will make (most of) workshop material available via webpage