



8 R&D of Vibration Imaging Radar



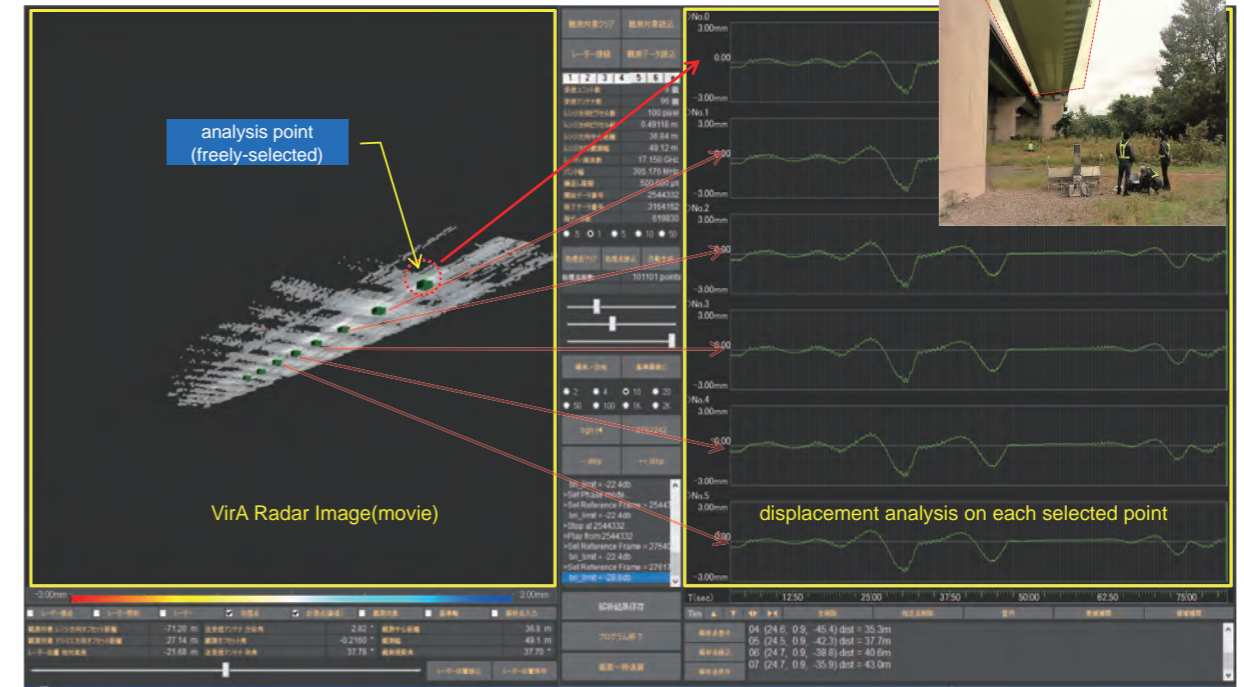
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Collaborative Research Groups Waseda University, Saitama University, Tokyo University

Current Accomplishments (2/2)

(Analyzed example of a bridge girder)

- Display acquired radar data as 1ms frame rate movie
- Graphical display – displacement, vibration with time graph of selected point



Vibration visualization and analysis software

R&D Objectives and Subjects

Objectives

By development of vibration visualization radar (VirA), we aim for improvement of safety and efficiency of inspection/monitoring of infrastructure, such as bridges and elevated roads.

- Monitoring Capability** : • Extract vibrations in infrastructures from observed radar phase images
- Safety and Efficiency** : • Measure vibrations without blocking traffic.
- Easy to transport and install.
- Non-contact vibration measurement system.

Subjects

- Develop vibration imaging radar system (VirA) using Digital Forming Technology. VirA observes infrastructures, such as bridges, as radar phase images up to 1000 times per second, and extracts vibrations at specific points. VirA measures (displacement) and variation as images with a vibration amplitude ≤ 0.1 mm, max. vibration frequency 500 Hz and an operational range of 100 m to 10 km.
- Develop a vibration analyzing algorithm and visualization program.
- Investigation of required measurement accuracy for infrastructure monitoring.
- Comparative verification with conventional infrastructure monitoring equipment.
- Application to infrastructure monitoring.

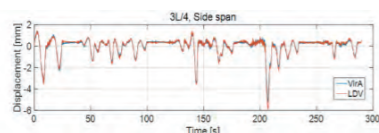
Current Accomplishments (1/2)

Contrast table of VirA Target specification and verification confirmation results

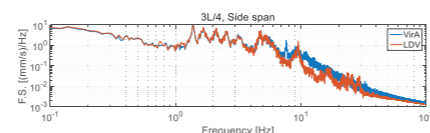
No	Target Spec	Result	
1	Observation Angle EL : 30 degrees AZ : 45 degrees	EL : 30 degrees AZ : 45 degrees	
2	Observation Range 100 m ~ 10 km	Confirmed range 30 m ~ 4,500 m	There is no place to confirm for more than 4,500 m.
3	Azimuth Resolution 0.5 degrees	0.5 degrees	
4	Imaging Reputation Speed 500 times/Sec	500 times/Sec	
5	Vibration Frequency 250 Hz MAX	250 Hz MAX	
6	Vibration Amplitude ≤ 0.1 mm	≤ 0.1 mm	
7	Consumed Power 4 RX Module ≤ 300 W 6 RX Module ≤ 400 W	4 RX Module 250 Wtyp 6 RX Module 350 Wtyp	
8	Size 2,000 (W) x 1,500 (D) x 1,600 (H) mm ≤ 70 Kg (without mounting base) (6 Rx Module)		



(Comparison measurement with LDV)



(Displacement comparison with LDV)



(Frequency histogram comparison with LDV)

Goals

