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An Investigation into the Acquisition Parameters for GB-SAR Assessment of Bridge Structural Components

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Structural health monitoring (SHM) is a necessary measure to maintain bridge infrastructure safe. To this purpose, remote sensing has proven effective in acquiring data with high accuracy in relatively short time. Amongst the available methods, the ground-based synthetic aperture radar (GB-SAR) can detect sub-zero deflections up to 0.01 mm generated by moving vehicles or the environmental excitation of the bridges [1]. Interferometric radars are also capable of data collection regardless of weather, day, and night conditions (Alba et al., 2008). However, from the available literature - there is lack of studies and methods focusing on the actual capabilities of the GB-SAR to target specific structural elements and components of the bridge - which makes it difficult to associate the measured deflection with the actual bridge section. According to the antenna type, the footprint of the radar signal gets wider in distance which encompasses more elements and the presence of multiple targets in the same resolution cell adds uncertainty to the acquired data (Michel & Keller, 2021). To this effect, the purpose of the present research is to introduce a methodology for pinpointing targets using GB-SAR and aid the data interpretation. An experimental procedure is devised to control acquisition parameters and targets, and being able to analyse the returned outputs in a more clinical condition. The outcome of this research will add to the existing literature in terms of collecting data with enhanced precision and certainty.

Keywords

Structural Health Monitoring (SHM), GB-SAR, Remote Sensing, Interferometric Radar

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