Bridge monitoring using InSAR data

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ABSTRACT

The utilization of Structural Health Monitoring (SHM) enables the monitoring of structural behavior over time and facilitates decision-making processes related to maintenance and repair requirements. Traditional SHM systems typically employ sensors directly attached to the structure to gain insights into its performance. Alternatively, satellite technologies offer an attractive alternative to conventional SHM approaches. These technologies allow for the measurement of displacements on a large scale and tracking their changes without the need for direct access to the structure. Moreover, the ability to monitor extensive areas creates new opportunities for developing automated alert systems capable of promptly identifying and flagging damaged structures. Nevertheless, it should be noted that displacements of civil structures can be caused by factors other than damage, such as thermal or periodic hydrogeological variations. These non-damage-induced displacements can impede the detection and progression of actual damage or result in false alarms if erroneously interpreted as damage indicators. This paper introduces a novel method for detecting damage based on DInSAR measurements, which effectively addresses both aspects by providing reliable information about the initiation of damage under varying environmental conditions over a period roughly twice as long as the satellite's revisit time.