

Application of Shape Memory Alloy as Shear Connector in Composite Bridges: Overview of State-of-the-Art

Authors : Apurwa Rastogi, Anant Parghi

Abstract : Shape memory alloys (SMAs) are memory metals with a high calibre to outperform as a civil construction material. They showcase novel functionality of undergoing large deformations and self-healing capability (pseudoelasticity) that leads to its emerging applications in a variety of areas. In the existing literature, most of the studies focused on the behaviour of SMA when used in critical regions of the smart buildings/bridges designed to withstand severe earthquakes without collapse and also its various applications in retrofitting works. However, despite having high ductility, their uses as construction joints and shear connectors in composite bridges are still unexplored in the research domain. This article presents to gain a broad outlook on whether SMAs can be partially used as shear connectors in composite bridges. In this regard, existing papers on the characteristics of shear connectors in the composite bridges will be discussed thoroughly and matched with the fundamental characteristics and properties of SMA. Since due to the high strength, stiffness, and ductility phenomena of SMAs, it is expected to be a good material for the shear connectors in composite bridges, and the collected evidence encourages the prior scrutiny of its partial use in the composite constructions. Based on the comprehensive review, important and necessary conclusions will be affirmed, and further emergence of research direction on the use of SMA will be discussed. This opens the window of new possibilities of using smart materials to enhance the performance of bridges even more in the near future.

Keywords : composite bridges, ductility, pseudoelasticity, shape memory alloy, shear connectors

Conference Title : ICBCMR 2021 : International Conference on Bridge Construction, Maintenance and Repair

Conference Location : London, United Kingdom

Conference Dates : July 26-27, 2021