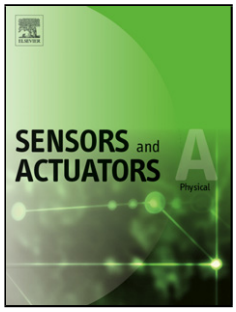

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Optical sensors for bond-slip characterization and monitoring of RC structures

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Highlights

- Optical fiber sensors applicability demonstration to monitor infrastructural interactions, more specifically between reinforcing rebar and concrete, which of the upmost importance in RC constructions.
- Two optical fiber sensors are presented, based on silica and polymer fiber Bragg gratings, which were implanted inside a concrete block specimen and subjected to a pull-out test
- The results confirm the viability and advantages of the optical sensors, evidenced by their higher resolution and far lower dimensions (allowing them to be embedded into the concrete) when compared with their electronic counterparts.
- The straightforward implementation and use of the optical sensors show very promising results when used in civil engineering structures.
- The strain sensitivity of the gratings that measure the bond-slip are 1.20 ± 0.01 pm/με and 1.47 ± 0.03 pm/με, for silica fiber and POF, respectively.
- The optical sensors proved to be a suitable way to detect very small slides in the steel-concrete connection, which is of extreme importance in the field of civil engineering, and currently there are very few solutions that detect such small displacements.
- Additionally, the structure surrounding the gratings was developed to be less intrusive as possible, making this sensor easy and practical to apply in RC constructions.

Abstract

Bond-slip is an important interaction between steel and concrete in reinforced concrete (RC) structures and other civil engineering constructions. It is essential to understand and to