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# Sensing Performance Assessment of Twisted CFRP with Embedded Fiber Bragg Grating Sensors Subjected to Monotonic and Fatigue Loading

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## Highlights

1. FBGs can survive exceeding two million cycles at high stress levels (up to  $4180 \mu\epsilon$ ).
2. Sensing behavior of smart CFRP bar with embedded FBG sensors remains good after two million cycles.
3. Online fabrication of smart stay cables with aforementioned smart CFRP bar is proposed and implemented.
4. Experiment results validate the capability of life-span monitoring of bridge cables subjected to fatigue loads.

## ABSTRACT

Cable force monitoring plays a key part in structural health monitoring (SHM) of long-span bridges. Long-term stability and durability of monitoring method is a major problem of bridge cable, which often suffers from fatigue loads. An in-situ and efficient monitoring method for cable force was proposed by using smart twisted carbon fiber reinforced polymer (CFRP) bar with embedded fiber Bragg grating (FBG) sensors. Sensing performance of smart twisted CFRP bar was evaluated through static and fatigue tests. Elastic modulus, sensitivity, reflection intensity and spectra were utilized

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