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## CFRP Systems with Embedded FBG for Structural Monitoring and Retrofitting

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The fields of activity in civil engineering are subjected to a constant change. Thereby maintenance, strengthening and monitoring of existing buildings have become more and more important. During the last ten years an increasing amount of Carbon Fiber Reinforced Polymer (CFRP) applications to rehabilitate damaged concrete or steel elements was observed. Thereby some important disadvantages of the brittle materials must be considered, for example the low ductility of the bond between CFRP and concrete and brittle failure of FRP. With embedded sensor systems it is possible to measure crack propagation and strains. In this paper a sensor based CFRP system will be presented, that can be used for strengthening and measuring. The used optical fibers with Fiber Bragg Gratings (FBG) have a large number of advantages in opposite to electrical measuring methods. Examples are small dimensions, low weight as well as high static and dynamic resolution of measured values. A Bragg Grating consists of a periodic sequence of artificial and equidistant refraction switches in the core of an optical fiber. It can be produced over embelazing of an interference pattern of ultraviolet light. The core is surrounded by cladding. The main problem during the investigations was the fixing of the glass fiber and the small FBG at the designated position. In this paper the possibility of setting the glass fiber with embroidery at the reinforcing fiber material will be presented. The direct embroider of the optical fiber (and the FBGS) clearly simplifies the fixing. An embroidery machine, using computerized support, is able to fix the fiber optical system accurately fitting at the carbon fiber material. By using computer-controlled machines it is possible to achieve a very high degree of prefabrication as well as a high productiveness. The economic industrial fabrication of smart structures can be realized. Another possibility is the direct converting at the building site by hand made lamination with an epoxy resin.

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**Ключевые слова:**

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