

5<sup>th</sup> World Congress and Exhibition on

# CONSTRUCTION AND STEEL STRUCTURE

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World Congress on

# CONCRETE STRUCTURES & CONCRETE TECHNOLOGY

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### **Externally bonded fiber reinforced polymer seismic strengthening of reinforced concrete structures**

Several studies available in the literature demonstrate that carbon, glass or natural fibers can be employed in Externally Bonded (EB) Fiber-Reinforced Polymer (FRP) strips for strengthening existing Reinforced Concrete (RC) members. The paper aims at presenting a large overview of research and field applications of retrofitting of RC structures by using Fiber-Reinforced Polymers. The focus will be done on research, field application and standard. The paper will also present recent research progress in this field promoting the use of natural fibers. The study consists of an experimental campaign and some analytical evaluations. The behavior observed in the tests on RC walls strengthened by FFRP is compared with both a reference wall and similar specimens strengthened with more conventional composite materials (i.e. Carbon-FRP, CFRP). The test results show that FFRP has the potential to be used for seismic retrofitting as a viable alternative to more common FRP materials and other traditional techniques. Indeed, RC wall specimens strengthened with FFRP show strength increases up to 150% and a ductility gains equal to about 30%. Moreover, the tests show that the walls strengthened by FFRP generally dissipate more energy than the ones strengthened with CFRP: this is an important property for seismic strengthening and retrofitting of existing RC structures.

### **Biography**

Ferrier Emmanuel has completed his PhD in 1999, he was an associate professor in Lyon 1 University (France) since 2000. He is now in a position of Professor in Lyon 1 University since 2009 and director of the laboratory LMC2 devoted to Composite Material for Construction. He is involved in Research in the field of FRP strengthening of RC structure. Since 1999, he has participated in the development of French standard on FRP strengthening of RC structure for the French Association AFGC. He is involved as a member of the executive committee of International Institute of FRP in Construction (IIFC).

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