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## Experimental investigation on the durability of carbon and basalt FRCM composites

### Motivations and aims

FRCM systems are widely used in many applications such as seismic retrofitting of masonry structures. thanks to their high strength-to-weight ratio. There are guidelines for their certification and for their design, but their long-term durability is still an open issue, which is further complicated by the wide range of constituent materials (for textiles and matrices) and their sensibility to different aggressive environments.



### Methods and results



The study carried out in this thesis is devoted to the mechanical behaviour of FRCM composites with basalt and carbon fabrics, embedded in lime-based mortars. In total, over 150 direct tensile tests were performed on bare textile and FRCM coupon specimens, after artificial aging in climatic chambers.. Basalt FRCM specimens were aged in alkaline solution (0.16%wt  $\text{Ca}(\text{OH})_2$ ), whereas carbon FRCM specimens were aged in salt solution (8%wt  $\text{Na}_2\text{SO}_4 \cdot 10\text{H}_2\text{O}$ ), at either 23°C or 40°C. Tests on aged specimens provided information on the deterioration induced by chemical aggression on the strengthening system under investigation. All experimental activities were carried out in the Laboratory of Structures of Roma Tre University

### Conclusions and future developments

Basalt FRCM composites resulted highly is sensitive to alkaline environments, whereas carbon FRCM systems exhibited a limited deterioration after aging in salt solution, even for very long (one year) durations. The temperature played a role, as specimens aged at 40°C showed a faster deterioration than those aged at 23°C. More tests are still needed to develop a deeper understanding of the durability of the different FRCM system against aggressive environments. This would help improve both certification and design guidelines.

