Preface

This book aims at summarising the results obtained in the Research Project entitled "Environmentally-friendly solutions for Concrete with Recycled and natural components" (EnCoRe, FP7-PEOPLE-IRSES-2011, Project ID: 295283), funded by the European Union as part of the 7th Framework Programme. The Project, whose activities have been developed during the three years 2012–2014, gathered three European Beneficiary Institutions (namely, *Università degli Studi di Salerno* and *Politecnico di Milano*, from Italy, and *Universidade do Minho*, from Portugal) and three non-European Partners (namely, *Universidad de Buenos Aires* and *Universidad Nacional de Tucuman*, from Argentina, and *Universidade do Rio de Janeiro*, from Brazil).

As stated by the title, EnCoRe was intended at investigating the physical and mechanical behaviour of cementitious composites made out of recycled and natural constituents. In fact, this is a subject of current relevance in both building technology and structural engineering, as a result of the growing interest to make the construction industry "greener". Specifically, the three following classes of materials have been considered:

1. Concrete with recycled aggregates and partial replacement of Ordinary Portland Cement (OPC);
2. Concrete reinforced with recycled fibers;
3. Cementitious composites internally reinforced with natural fibers or textiles.

However, this book is structured into two main parts. Part 1 covers the behaviour of a material belonging to the first one of the aforementioned classes and often referred to as Recycled Aggregate Concrete (RAC), as it is made with Recycled Concrete Aggregates (RCAs). Further insights are also reported on the effect of replacing OPC with Fly Ash (FA), a by-product of carbon-fed power plants, which is characterised by marked pozzolanic properties. Part 2 summarises the results obtained on cementitious composites internally reinforced with either recycled or natural fibers. Specifically, Recycled Steel Fibers (RSFs) obtained from post-consumed pneumatic tyres, and Natural Fibers (NFs) produced from tropical plants, such as sisal, are considered in this section.

The two main parts of this book consist of a number of *sections* treating the relevant knowledge derived from the research carried out as part of EnCoRe, which was also complemented with the available information in the performed literature review. The organization and contents of the sections aims to provide information from the technology up to the design. In fact, they summarise the empirical evidence about the physical and mechanical behaviour of the materials under consideration, and outline the theoretical models and the numerical procedures that can be formulated and implemented for simulating the behaviour of these materials. Moreover, a first attempt to propose a consistent conceptual formulation capable to make "predictable" their mechanical properties is also reported.

Although enhancing sustainability of cementitious composites is the fundamental motivation of this study, no consideration is reported within the book about the Life Cycle Assessment (LCA) of the materials addressed by the EnCoRe project. However, since the Project has contributed to an advance of knowledge on the mechanical behaviour of the aforementioned "environmentally-friendly" materials (and, hence, on their potential to be employed in field applications), its results can be used as input data by environmental scientists eventually interested in performing LCA on the materials investigated as part of the EnCoRe Project.

Finally, the book editors wish to acknowledge the tremendous contribution given by the members of the research groups belonging to the six Institutions that took part in EnCoRe: their names are listed at the beginning of each book section with the twofold aim to highlight the role played by the each researcher and the cooperation developed between the concerned research groups.

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