



## BOOK REVIEW

**"HIGH PERFORMANCE FIBER REINFORCED CEMENT COMPOSITES (HPFRCC 2)"**-Proceedings of the Second International RILEM Workshop-RILEM Proceedings 31. Edited by A.E. Naaman and H.W. Reinhardt. E & FN Spon, an imprint of Chapman and Hall, 1996, 506.p. ISBN 0-419-21180-2

This book is a proceedings of a workshop which is the second of a series devoted to *high performance fiber reinforced cement composites* (HPFRCCs). The workshop took place in Ann Arbor, USA, in June 1995. The first one was organized in Mainz, Germany, in June 1991. The workshop was funded by the US National Science Foundation and the German Deutsche Forschungsgemeinschaft. The workshop was sponsored by RILEM, and co-sponsored by ACI, ACBM, the University of Michigan and the University of Stuttgart.

Improved combination of properties leading to high performance materials are essential for constructing, repair and rehabilitation, and for extending the life of civil infrastructure systems. "*High performance*" implies an optimized combination of properties such as quasi-strain hardening behaviour, strength, toughness, energy absorption, stiffness, durability, and corrosion resistance.

Definition of "*high performance*" fiber reinforced cement composite material selected for this workshop was to define a lower bound limit based on the shape of its stress-strain response in tension. That is: if the stress-strain curve shows a quasi strain-hardening behaviour, then "*high performance*" is achieved or achievable. (Quasi strain-hardening behaviour is also termed as pseudo strain-hardening behaviour, or elastic-plastic behaviour or better, or post-cracking strength larger than the cracking strength). Quasi strain-hardening behaviour is generally accompanied by multiple cracking and the related advantage of large energy absorption consumed during the multiple cracking process.

The main objective of this workshop was to provide a forum for discussion, among specialists, as to the latest developments in the field of HPFRCCs, to summarize up-to-date advances in the state of knowledge, to identify future research needs, and to suggest directions to follow. However, the format was unlike most other workshops and symposia, in that a number of issues were preselected for discussion. These were divided into thirteen topics, to become thirteen chapters of the proceedings. For each chapter, two participants agreed to take on the task of chapter leaders, and other participants were asked to contribute only to one of the preselected topics or chapters. The overall result is a much more focused workshop, addressing only issues deemed important for discussion by researchers at the cutting edge in the field, and providing a reference base to build on for future improvements and research.

The following topics were addressed: characterization of high performance fiber reinforced composites; specific production and manufacturing issues; micromechanical models of the mechanical response of HPFRCC; cyclic behaviour, fatigue strength, endurance limit and models for fatigue behaviour of FRC; fiber-matrix interfaces; toughness characterization and toughening mechanisms; computer models; reinforced and prestressed concrete using HPFRCC matrices; bond of reinforcing bars and prestressing tendons in HPFRCC

matrices; standard testing; infrastructural repair and retrofit with HPFRCCs; practical structural applications of FRC and HPFRCC; future research needs in the field of HPFRCC. Discussions during the workshop were summarized in a separate chapter.

The volume includes very valuable contributions that may be of interest not only for professors, researchers and Ph.D. students but also for practitioners who intend to learn the behaviour and applicability of high performance fiber reinforced cement composites.

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