

## PREFACE

Thirty years ago, fracture mechanics was considered to be a highly interesting academic subject without any relevance for the design, construction, and maintenance of concrete structures. Few and isolated groups worked in this field and they met on the occasion of well established international conferences on fracture mechanics such as ICF. In these big conferences, usually one or two sessions were devoted to concrete.

Suddenly, engineers who at that time had no idea of what fracture mechanics really implies got fascinated by this approach and the view was spread that civil engineering would experience a real revolution with the introduction of fracture mechanics into structural analysis. These expectations certainly could not and will never be satisfied. But in this situation, RILEM took a lead and set up a first technical committee on fracture mechanics (RILEM TC 50-FMC). The aim originally was to present a comprehensive documentation on the state-of-the-art (Fracture Mechanics of Concrete, ed. F.H. Wittmann, Elsevier (1983)) and to prepare recommendations on a generally accepted test method to determine fracture mechanics parameters. No doubt, practically everybody expected a standardized method on how to determine  $K_{IC}$  of concrete when this committee was set up.

It was during the first meeting of the new RILEM technical committee, held in Delft, The Netherlands, when Arne Hillerborg asked to present his ideas on fracture mechanics in 15 minutes. At that time, nobody really understood the significance of his ideas and long discussions and patience were necessary to convince a majority of committee members, including the chairman, that the fictitious crack model (FCM) was more realistic to describe cracking of concrete-like materials than LEFM. Finally, the elaboration of the RILEM recommendation on the determination of fracture energy of concrete in 1985 was essentially the work of Arne Hillerborg. This publication can be considered as a real milestone (Materials and Structures (1985) 18, 285-296). We are therefore very glad and proud to have Arne Hillerborg as an honorary guest among the participants to FRAMCOS-2.

Once this test method and the underlying concept were published and generally accepted, the number of papers dealing with applications of non-linear fracture mechanics to concrete and concrete structures, both numerically and experimentally, increased exponentially. It became difficult to follow all these activities.

It was Zdeněk P. Bažant who took the initiative and in summer 1990 approached a number of colleagues in order to set up IAFRAMCOS, an international association with one major aim: the organization of a conference on "Fracture Mechanics of Concrete Structures" in regular intervals, typically three years. The first conference was held in Breckenridge, Colorado, USA, in 1992 under the chairmanship of Zdeněk P. Bažant. Proceedings of FRAMCOS-1 can be considered as a documentation of the state-of-the-art reached three years ago. At the end of this most successful meeting the general assembly of IAFRAMCOS voted for Zurich to be the place for the second conference, FRAMCOS-2.

We hope to meet again the high standards required for FRAMCOS Proceedings with these volumes. In order to achieve conformity of the presentation we reviewed all submitted contributions carefully and asked some authors for corrections. It was a pleasure to experience a spirit of cooperation with most authors. The few who were not absolutely convinced of the necessity of the proposed corrections will hopefully also be satisfied with the final product.

It is my great pleasure to thank my co-workers for their enormous efforts. Dr. Alejandra M. Alvaredo worked many hours in parallel with the preparation of her own contributions to review and correct papers conscientiously. Mr. Giovanni Martinola and Mr. Bernhard Trunk helped efficiently in this delicate and time consuming operation. Special support by ASMES (Association Suisse pour la Mécanique des Structures) to cover part of the costs for the production of the conference proceedings is gratefully acknowledged. Finally, we could not have finished the editing process in time without the personal engagement of Mrs. Irene Kalt and Mrs. Brigitta de Chapeaurouge.

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