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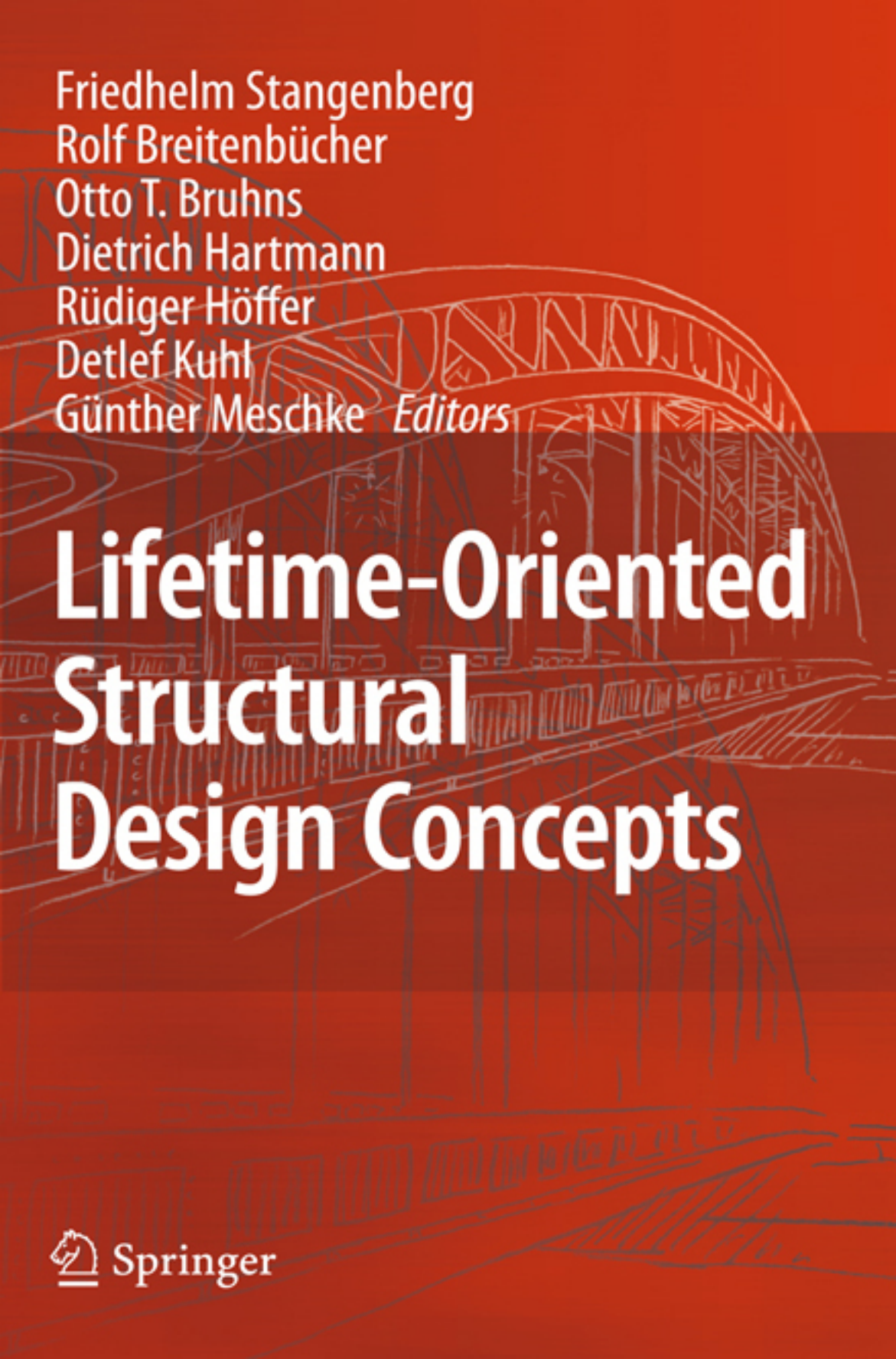
Rüdiger Höffer
Detlef Kuhl
Günther Meschke *Editors*

Lifetime-Oriented Structural Design Concepts



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Lifetime-Oriented Structural Design Concepts

Springer

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in Industry and Academia

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Preface

At the beginning of 1996, the Cooperative Research Center SFB 398 financially supported by the German Science Foundation (DFG) was started at Ruhr-University Bochum (RUB). A scientists group representing the fields of structural engineering, structural mechanics, soil mechanics, material science, and numerical mathematics introduced a research program on "lifetime-oriented design concepts on the basis of damage and deterioration aspects". Two scientists from neighbourhood universities, one from Wuppertal and the other one from Essen, joined the Bochum Research Center, after a few years. The SFB 398 was sponsored for 12 years, until the beginning of 2008 – this is the maximum possible duration of DFG financial support for an SFB.

Safety and reliability are important for the whole expected service duration of an engineering structure. Therefore, prognostical solutions are needed and uncertainties have to be handled. A differentiation according to building types with different service life requirements is necessary. Life-cycle strategies to control future structural degradations by concepts of appropriate design have to be developed, in case including means of inspection, maintenance, and repair. Aspects of costs and sustainability also matter.

The importance of structural life-cycle management is well recognized in the international science community. Therefore, parallel corresponding activities are proceeding in many countries. In Germany, two other related SFBs were established: SFB 524 "Materials and Structures in Revitalisation of Buildings" at Weimar University and the still running SFB 477 "Life-Cycle Assessment of Structures via Innovative Monitoring" at Braunschweig University of Technology. With these two SFBs, a fruitful cooperation was developed.

The Cooperative Research Center for Lifetime-Oriented Design Concepts (SFB 398) at Ruhr-University has carried out substantial work in many fields of structural lifetime management. Lifetime-related fundamentals are provided with respect to structural engineering, structural and soil mechanics, material science as well as computational methods and simulation techniques. Stochastic aspects and interactions between various influences are included.

Thus, a solid basis is provided for future practical use and, e.g. also for standardization.

The wide range of scientific topics among the specification and determination of external loading and the simulation based lifetime-oriented structural design concepts is presented in an extraordinary format. All scientists of the SFB 398, professors and Ph.D. students, have contributed with a great effort in matchless team work to the present book. As a result of this, the present work is not only a collection of project reports, in fact it is almost written in the style of a monograph, whereby several authors fruitfully interact in all sections from the highest to the deepest level. Within this philosophy of joint authorship, authors are denoted in chapters and sections down to the third level. In special cases, where authors have contributed to a selected deeper section level, they are denoted beside the standard procedure in the regarding text episode.

All members of SFB 398, with sincere thanks, acknowledge the financial support of DFG over more than 12 years. The dedicated research work of all participating colleagues and of many guest scientists from diverse countries also is gratefully mentioned.

Finally, the great efforts of Springer-Verlag, Heidelberg, to produce this attractive volume is appreciated very much.

Bochum,
March 26th, 2009

Friedhelm Stangenberg, Chairman of SFB 398
Otto T. Bruhns, Vice-chairman of SFB 398

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