

Preface

Nowadays commercial computer programs are normally used for engine and vehicle development for e.g. the simulation of the transient performance of vehicles or of the complete power train as well as for the simulation of high-grade transient processes in the engine combustion chamber.

As in general no source code for these computer programs is available and due to time-consuming studies of the corresponding descriptions users often have insufficient knowledge concerning the physical and chemical contents of the models used in these programs. Therefore it is our special concern to reveal different physical and chemical approaches and to show options and limits of the models used. So the focus of this book is definitely on the thermodynamical, fluid mechanical and chemical base of modeling of motor-driven processes.

The book is composed of three parts. Part I describes the operation and the thermodynamically base of combustion engines, the combustion and reaction kinetics as well as emissions building in six chapters. This chapter is completed by a proceeding concerning combustion measurement. Part II with Chaps. 7–9 is dedicated to the operating process calculation, the charging process and the modeling of exhaust after-treatment systems. Part III contains Chaps. 10–15 and starts with the overall process analysis. Part III is preferentially about the calculation possibilities in the combustion engine for e.g. phenomenological combustion models, simulation of injection and combustion and 3D simulations for fluid flow and supercharging.

We hope that we succeeded in showing a comprehensive and current description of the simulation of motor-driven processes and we would appreciate if all academic and technical users will profit from this book.

We thank all authors for their constructive and diligent co-operation. All authors and their employers or institutions as well as their responsibility for the proceedings are mentioned in the prefix of the book. We say special thanks to AVL List GmbH for their professional and substantial support during the compilation of this book. We are much obliged to Mr. Gary Patterson who made the final correction of the English translation and we are also very thankful for his critical remarks concerning

the precise terminology. Many thanks also to the Springer-Verlag especially to Mrs. Ulrike Butz for the kind and good co-operation.

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