

# Preface

In spite of the economic crisis of transport sectors such as the aerospace or naval, the automotive sector is facing a really challenging time. The trends in this sector during the past years had been focused on minimizing the pollutants, namely  $\text{NO}_x$ , CO, HC or PM. However, the efforts in the next years are moving towards the  $\text{CO}_2$  reduction, and thus minimizing the fuel consumption without worsening the pollutants. In the case of gasoline engines, the emissions problem is relatively solved since years by the three-way catalyst but for diesel, the use of different after-treatment systems as well as new combustion systems and control improvements are necessary. At the same time, the introduction of new fuel types and the development of the electric or hybrid vehicles introduce indeed new possibilities to the engineers.

The diesel engine requires a renewal of the number of information sources available in order to monitor and control all the variables that affect the correct performance of this complex system. A good example is the on-board diagnostics algorithms necessary to monitor the  $\text{NO}_x$  emissions, required for the urea dosing of the selective catalyst reduction systems or useful for the development of direct  $\text{NO}_x$  control.

Within this framework, this book intends to give solutions to real problems on the topic of the online estimation of the exhaust engine variables in diesel engines. The reader will find a number of methods and algorithms that cover the main possibilities for inferring the exhaust variables on-board:

On-board sensors

Control oriented models

Data fusion methods for combining the information from sensors and models.

At all times, I have tried not to forget the application and motivation of this work, so that all the methods and solutions presented, have been applied to real engine data for the estimation of  $\text{NO}_x$  and exhaust lambda. In addition, it is well known that the electronic control unit capacities are limited and thus the computationally efficiency and the simplicity of the methods are mandatory in order to implement the methods on-board. The reader will find then, that these guidelines are kept, so that chapters which cover the engine setup or the applied results are combined with

others that directly cover the mathematics of the methods and the development of on-board suitable methods.

From my current position in an automotive company, I am able to test myself the utility of the methods when using them for a big number of tasks in different projects. I would be really satisfied if I could see how this work can be useful for other people in the automotive field or any other field. Furthermore, I am really open to hear the opinion from my colleagues regarding the methods developed here or indeed from some improvement suggestions. I still feel that there are lots of things to do in the field of the adaptive modelling or observation. From my modest contribution, I would like to do my one's bit on this field.

Aachen, May 2014

Dr.-Ing. David Blanco-Rodriguez

<http://www.springer.com/978-3-319-06736-0>

Modelling and Observation of Exhaust Gas  
Concentrations for Diesel Engine Control

Blanco-Rodriguez, D.

2014, XVII, 190 p. 89 illus., 1 illus. in color., Hardcover

ISBN: 978-3-319-06736-0