Foreword

Predicting air pollution dispersion in a region is a paramount topic usually integrated in Air Pollution Control Engineering courses. As a former professor of a similar course at the University of Minho, I have shared this interest with the author of this book. Romualdo Salcedo, Professor at the University of Porto, has preceded me as an invited teacher of the Biological Engineering undergraduate programme at UMinho and enthusiastically introduced me to several aspects of Air Pollution Control Engineering (and optimization) with the emphasis on Air Pollution Modeling (APM).

The teaching of air dispersion modelling has changed significantly in recent years, in large part due to new regulations and the availability of dedicated software tools. This book intends to serve as a reference to follow-up on a better comprehension of air pollution modeling with the aid of hands-on user-friendly software, highlighting the main advantages (but also disadvantages) of using Gaussian dispersion as the main drive to teach this subject. Throughout the book, author Romualdo Salcedo guides readers with an interactive multisource dispersion estimation tool, helping them understand how air dispersion models work.

IMDIS – A Teaching Tool for Air Pollution Dispersion Modeling begins with a background section that enables readers to quickly enter on APM subject. Next, the book offers sections on air dispersion model highlights and model evaluation, including:

- Calibration of dispersion models with site observed data and the usefulness of the model for uncorrelated sites.
- Comparison with analytical solutions and short-term models (CEMAPS and PTMAX) using examples from the literature.
- Extensive comparison with experimental data (five stacks emitting SO_2 from a petrochemical complex; one stack emitting SO_2 and fine particulates from a pulp and paper unit) and long-term models (Texas Climatological Model).
- Estimation of maximum concentration and critical conditions through a powerful global non-linear optimizer. This capability derives from the author knowledge and more than 35 year experience on numerical optimization that resulted in the development of powerful search algorithms for the global optimum for constrained non-linear continuous (NLP) and mixed-integer (MINLP) problems.
- The IMDIS (Interactive Multisource Dispersion) companion software, a graphical menu-driven computer program, is provided with the corresponding open free code. Independent modules exist for meteorological data, dispersion coefficients and sources. The book includes a detailed Operating Manual containing the program structure, the user interface guide and the fundamentals and examples of APM calculations. Readers can work with these examples to perform their own calculations.

With its comprehensive coverage, IMDIS – A Teaching Tool for Air Pollution Dispersion Modeling is recommended for engineers and scientist who need to perform and evaluate environmental impact assessments. The book's many examples and systematic instructions, strengths very different from traditional books, also make it ideal as a textbook for educational applications in the fields of chemical, biological and environmental engineering and environmental sciences.

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