

ADVANCES IN COMPUTATIONAL MODELING FOR ENVIRONMENTAL ENGINEERING

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ABSTRACT

Increasing of computational simulation capabilities together with environmental public concern are continuously pushing for more realistic modeling of engineering processes of environmental interest.

Although very diverse contributions can be found regarding applied and theoretical works within this scope, some problems are found to be in common in fields apparently as different as air quality models or biochemical waste and wastewater treatments. Thermal and phase-change coupling with flow descriptions, large number of species involved, highly non-linear reaction terms, very different time-scales embedded within the reacting models and the need of adaptative spatial discretization schemes to manage properly heterogeneous processes are some of the most relevant computational challenges for realistic simulations of problems related with quality of air, water, or, in general, all flowing continuous media.

The interest of this minisymposium is to focus in three main practical environmental engineering problems that share most of these computational issues:

- Outdoor air quality modeling at local scales (up to few tens of kilometers)
- Water quality modeling at local river-basin scales
- And waste, wastewater and gas-phase emissions treatments where heterogeneous description is a key issue for a realistic description of the process.

Key topics of the minisymposium will be:

- Realistic modeling of atmospheric and hydrological flows at local scales
- Computationally efficient modeling of punctual and distributed emissions
- Biochemical reaction and phase-change transformation of solid, liquid and gas-phase species
- Transport and reaction in complex three-dimensional domains

Presentations dealing with the following issues are specifically welcomed:

- Benchmarks and reference problems.
- Dimensionless analysis and adaptive modeling.
- Spatial discretization strategies for complex domains.
- Numerical methods for large non-linear transport – reaction problems
- Analysis and improvements of commercial and open-source software packages.
- Illustrative case studies and teaching/learning resources.