

CFD METHODS IN COMBUSTION, POLLUTANT FORMATION AND EXHAUST AFTERTREATMENT

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ABSTRACT

The combustion process is a main challenge in many applications like internal combustion engines, gas turbines, burners and furnaces. Future emission legislation limits and the necessary reduction of greenhouse gases can only be achieved if the combustion process will be further improved with respect to fuel efficiency and pollutant formation. The exhaust aftertreatment further reduces the raw emissions to the required limits.

Numerical methods like computational fluid dynamics offer the possibility to study the turbulent flow in the combustion chamber and in the exhaust pipes, the preparation of gaseous, liquid and solid fuels, the ignition of the evaporated mixture, the flame propagation and the pollutant formation. Additionally, the modelling of the species diffusion to reactive surfaces and the species conversion may be described.

Therefore, this MS will invite researchers and experts from the industry to present the most recent results in the field of premixed, non-premixed combustion, pollutant formation and reaction kinetics. Advancements in the modelling of the following topics will be presented and discussed:

- Premixed and non-premixed combustion
- Physical and chemical models of fuel properties
- Spray atomisation, wall film formation and melting/sublimation of solid fuels
- Turbulence models that improve the description of the species mixing and the flame propagation
- Modelling of reaction rates in turbulent flows (e.g. PDF approaches)
- Kinetically controlled reaction (pollutant formation, irregular combustion)
- Species transport in porous media and catalytic reactions