ThermoCombustion

Software developed for combustion processes’ characterization. Major application to industrial combustion processes, such as combustion heat or electricity generation processes; whether they take place in steam generators, gas turbines or stationary engines, and in industrial furnaces (with or without fire contact).

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Characteristics

- Solid technology
- Precision
- Easy handling
- Intuitive interface
- Input variability
- Application in several industrial systems

Software capabilities

- Thermo-chemical analysis
- Mass, energy and exergetic balance
- Energetic flow and Grassmann diagram
- Thermal and exergetic efficiency
- Combustion diagrams
- Sensitivity analysis
- Pollutant emissions control

Applications

Improvement of combustion process design, comprehensive study of main variables effect in the combustion, whether reducing irreversibilities or pollutant emissions; or performing several sensitivity analysis that ThermoCombustion facilitates by default.

Main application in industry for process optimization or in academia (technical studios).

Characteristics

Software algorithms are based on up-to-date bibliography and the latest mathematical models, which in conjunction result in a well-defined and solid technology. The software has been set up with an intuitive interface that allows easy handling.

Input variability

Available calculations with solid (including coals, biomass and biodiesel) and liquid fuel.

Fuel selection features

Application in several industrial systems

Combustion chamber, industrial furnace, steam boiler or combustion turbine (internal or external).

Industrial combustion systems available to analyse

Thermo-chemical analysis

As a first step, a mass balance of combustion products can be obtained. Strict analysis on whole range of fuel properties: calorific powers, specific heat, enthalpy of formation, chemical exergy and entropy.

Composition of the fuel (ultimate analysis)
Solid fuel: exhaustive thermodynamic study related to the composition of ashes: molecular weight, enthalpy of formation, entropy, exergy, melting temperatures and fouling tendency among others.
Pollutant emissions control

Includes critical pollutants as carbon monoxide (CO), nitrogen oxides (NO, NO₂) or sulfur dioxide (SO₂), ash, among others. To reduce the amount of hazardous air pollutants emitted by commercial and industrial boilers, it is necessary to know exactly and completely the behavior of a certain fuel when it is subjected to a reactive process, in order to act effectively through a control mechanism. For example, while replacing a significant amount of coal with wood would reduce sulfur emissions, the effect on other pollutants is not straightforward.
Applications

In summary, Thermocombustion (for biomass and biodiesel) provides a complete solution of combustion processes; analysing the effect of the main variables that participate in the process, through the possibility of performing a graphical sensitivity analysis.

Whole range of software capabilities facilitates an improvement in combustion process design, an exhaustive study of main variables effects, and the possibility to reduce irreversibilities or pollutant emissions. A final report (set up by the user) can be submitted, containing graphs and predictions.

Major application for process optimization in industry or combustion processes study in academia.

Application specifications

This software's capabilities are appropriate for combustion studies in academia. The features explained above are highly useful. Moreover, a prediction of thermodynamic properties of combustion products and equilibrium composition can be obtained.

Theoretical determination of the equilibrium composition and thermodynamic properties of combustion products, related to temperature and pressure, as well as the dosage used or the fuel gas mixture, according to chemical balance and dissociation.

Composition analysis of combustion products on chemical equilibrium

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