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ICEEM/02 – ENVIRONMENTAL ENGINEERING SECTION

"Environmental Modelling, Simulation and Optimization"

ENVIRONMENTAL ENGINEERING SUPPORTED BY PROCESS SIMULATION

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Abstract

Many processes relating to environmental topics, e.g. the generation of power or potable water, show a high degree of complexity. Facing computational capacities and numerical algorithms rapidly developing, the evaluation of the corresponding technologies by simulation methods gains more and more importance. The field of process simulation dealt with in this paper aims to support and optimise the basic design of chemical processes by predicting the overall heat and mass balances. This information enables:
▪ the creation of appropriate sequences of chemical and physical unit operations;
▪ the definition of the operating conditions (pressure, temperature, concentration);
▪ the selection of operational supplements (chemicals, energy sources);
▪ the assessment of output properties (product quality, pollutants).
This process analysis delivers the optimum configuration in ecological and economical respect. For modelling the processes, the commercial software tool IPSEpro (Perz, 1990) is applied. The tool offers an extensive modelling environment for description of substances, streams and unit operations in an object-oriented manner; the according steady mass and heat balances are set-up to yield a system of equations, which is solved simultaneously. The simulation result is a graphical and mathematical flowsheet of the objective process, its load dependent solution delivers detailed prediction of the key informations listed above. For demonstration of this simulation method and its support to environmental considerations, the modelling procedure and two processes analysed are presented:
▪ thermal power generation including fluegas cleaning, emphasizing on waste incineration
▪ co-generation of power and water by thermal desalination

Keywords: modelling, process simulation, engineering software, waste combustion, water treatment

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