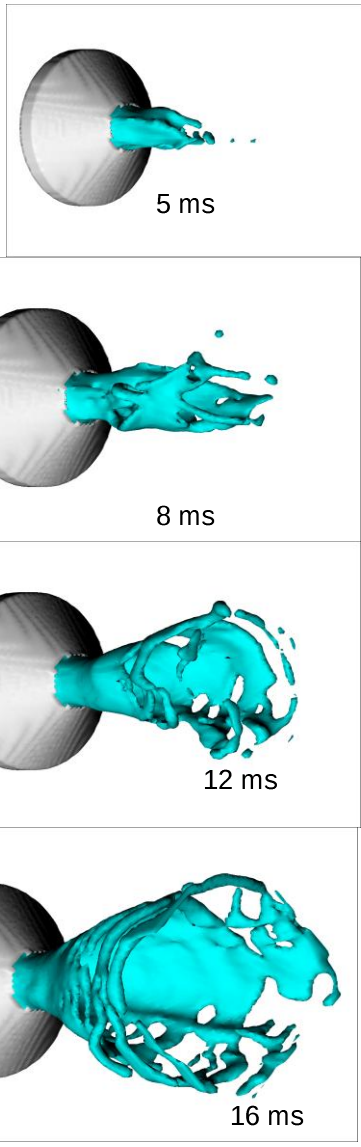
SimSpray

SimSpray is a computer tool for designing and testing spray nozzles in a virtual environment. Because of the complexity of the flows existing in spray systems, there is no accurate technique that can relate the nozzle design to the spray characteristics. Currently, spray nozzles are designed based on experimental measurements. This process is time consuming and costly. This computer tool makes it possible to accurately predict the resulting spray of a nozzle using flow simulation.

The model used in **SimSpray** is three-dimensional and combines a fixed mesh discretization of the Navier-Stokes equations with a piecewise linear volume tracking algorithm to track the free surfaces of the liquid in presence of a complex shape of a nozzle body.



Computer simulation of the flow evolution into a swirling spray nozzle and film formation and breakup at the nozzle exit

Applications

SimSpray can be used to:

- design new spray nozzles;
- improve current nozzle designs;
- provide the flow characteristics of a nozzle: flow inside the nozzle; film thickness and velocity distribution at nozzle exit; resulting spray angle and spray pattern; and mean spray drop size and drop size distribution (verified in splash-plate nozzles);
- investigate the spraying characteristics of a nozzle under different operating conditions.

Some specific industry applications are:

- spray combustion in furnaces, gas turbines, and rockets;
- spray cooling; powdered metallurgy;
- spray painting, agriculture spraying; fire sprinklers; and many other applications in medicines and meteorology.

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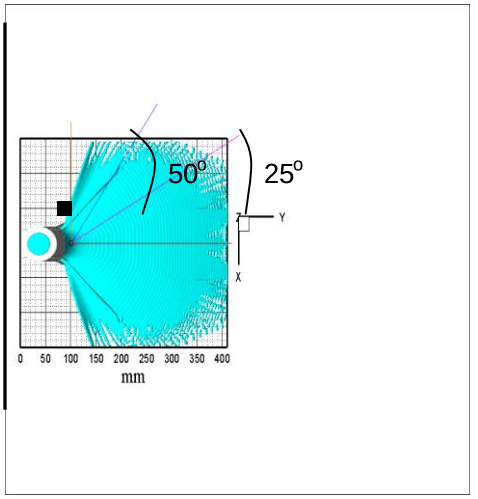
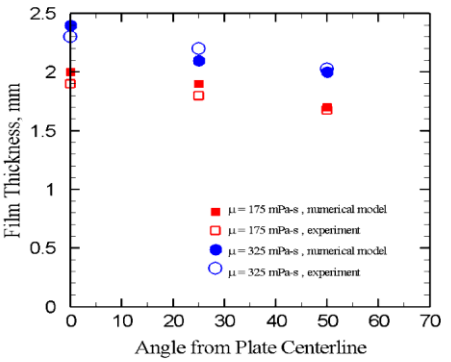
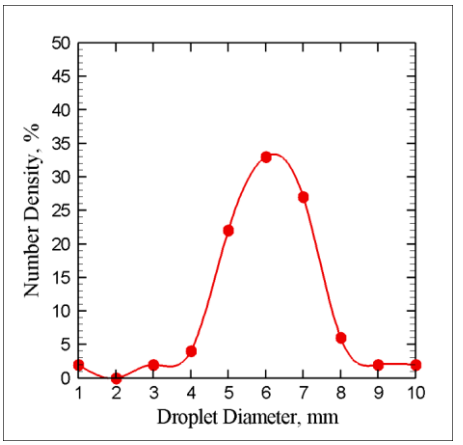


Simulated spray image of a splash-plate atomizer



Comparison between simulation results and measurements for a splash-plate nozzle



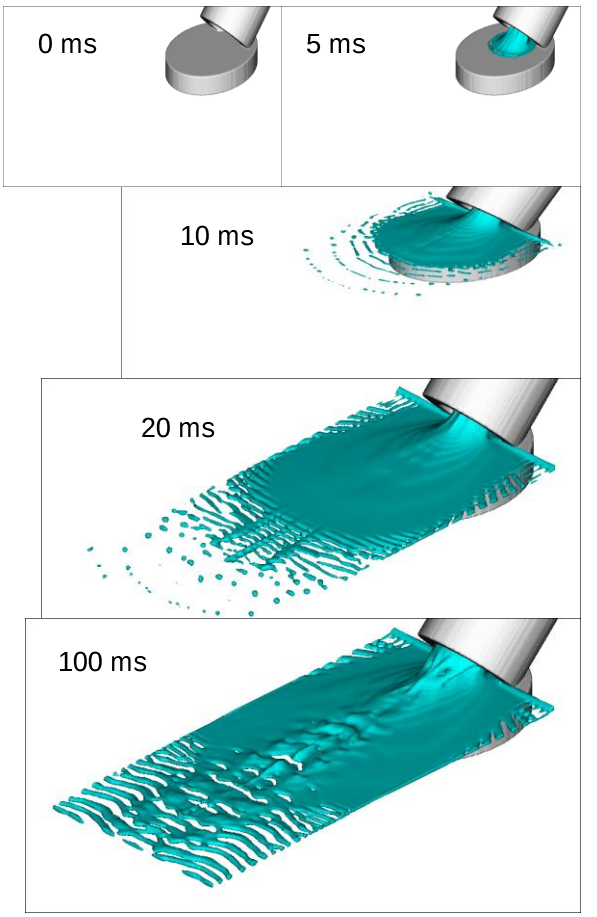
Results of simulation for drop size distribution in a typical splash-plate nozzle

About Simulent

Simulent is the leading CFD software development, marketing and consulting company specializing in free surface flow simulation and analysis.

Features

SimSpray is capable of simulating flow and spray in various types of spray systems such as splash-plate nozzles, swirling spray nozzles, and pressurized spray nozzles.
The program is efficient and robust. The CPU times required for a simulation are within the reasonable times set by the industry.
The method used in the program has been proven accurate by direct comparison with extensive experimental measurements.
The program is facilitated with an interface linked directly to a preprocessor (ICEM-CFD) in order to import the complex shape of a spray nozzle, build the proper mesh, and input initial and boundary conditions.
The output files are formatted for post processing with Tecplot software.



Computer simulation of atomization and spray formation in a splash-plate atomizer of a kraft recovery boiler

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