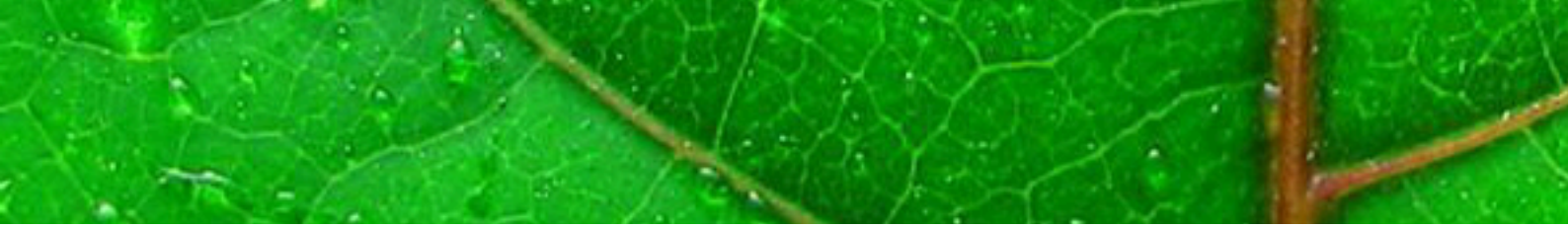

Modeling and numerical optimization of reactive and extractive distillation processes

In the past, "process intensification" focused essentially on the optimization of Reactive Distillation. Over the period of interest, this theme was the subject of a great many studies:

- Parametric and structural optimization of catalytic distillation. The optimization problem formulated was based on mixed integer nonlinear programming (MINLP)and was resolved in the MIPSYN software environment.

- Valorization of glycerol, a by-product of biodiesel synthesis, into edible oil (triacetin). The study first focused on kinetics characterization, then on the feasibility of a synthesis process using reactive distillation.

- Structural and parametric optimization (MINLP optimization) of catalytic distillation based on a thermodynamic criterion (minimization of irreversibilities thanks to the exergy consumed).

More recently, we formulated a problem of optimal control (in the sense of Pontryagin's principle) of an extractive distillation column for the production of agro-fuel (ethanol). This work was then generalized by integrating parametric optimization (operation and dimensioning) of the column into the optimal control problem.