Co-simulation for detailed equipment design – spray dryers

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The combination of CFD and advanced process modelling provides powerful insights in cases where mixing effects caused by non-homogeneous flow profiles and complex physics and/or chemistry both must be considered, and still reasonably low computational times must be ensured. For example, when designing and optimizing a spray dryer chamber where a slurry feed is dried with a hot gas stream, several questions must be answered carefully like the nozzle type, initial droplet size distribution, properties of the hot gas stream, positioning of the inlets and outlets, residence time etc. But also, certain process constrains like the maximum droplet temperature must be satisfied to not degrade product quality. And finally, the design of the spray dryer chamber cannot be optimized without considering the whole process including input and output streams. This means, the simulation of the process spans several orders of magnitude in time and space and an efficient way of simulating all relevant phenomena is needed.
This presentation describes the principles, practice and benefits of combining these two technologies, illustrated with examples.