

Compartment model structure identification with qualitative methods for a stirred vessel

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Solving process design, process optimization, safety analysis, etc. problems relies widely on mathematical models of the process. To solve problems related to mixing detailed models, such as compartment models or Computational Fluid Dynamics (CFD) models, are required. Compartment modelling generally uses four basic compartments: the mixer, the distributor, the perfectly mixed reactor and the ideal plug flow reactor. The main modelling tasks using compartment models is to define the structure of the compartment model, and the parameters of connections between the compartments. Hence, a qualitative approach was developed to support the identification process. Qualitative methods can be applied to analyse experimental data and to compress the information content of a time series. The primary goal of this study is to present an algorithm based on qualitative analysis that can be used to identify a compartment model structure based on the hydrodynamic measurement data of a stirred reactor.

Keywords: stirred reactor; structure identification; qualitative method; compartment model