Etude de la sécurité thermique d'un réacteur chimique : approche par contrôle de la température

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Abstract

In this thesis, my contribution focuses on the development of a methodology for intelligent control of the maximum temperature in a tubular reactor. These expressions are derived from an analytical model previously published by (Vernières-Hassimi et al., 2016) and have been adapted and simplified for their application in this context. The first analytical expression developed concerns the calculation of the position of the maximum reaction temperature, a fundamental parameter for safety in tubular reactors. This expression allows for the analysis of the behaviour of the hot spot inside the reactor and how its position varies according to changes in input parameters, which facilitates a more appropriate selection of operational configurations. Furthermore, this expression integrates with the formula previously developed by (Vernières-Hassimi et al., 2016). The second expression results from a resolution of the original equation, through which the reactor's cooling temperature is calculated. This expression is particularly useful for determining the cooling temperature in response to variations in operational conditions, thus providing an effective tool for the thermal management of the system.