过程系统工程

换热网络操作夹点分析与旁路优化控制

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摘要

换热网络夹点设计法是从设计的角度，针对某一给定的典型操作条件而进行的，而炼油化工过程的生产条件经常在一定范围内波动。在实际的生产中，换热网络的操作夹点和最小温差与设计值往往不尽相同，为换热网络的优化控制带来了一定困难。因而近年来对于换热网络夹点技术以及旁路优化控制方面的研究不断深入，但将夹点技术与换热网络控制集成的方法仍不成熟。本文从操作的角度求解并分析换热网络结构已定或网络正在运行情况下的操作夹点，定性分析操作夹点的变化规律，并提出在操作夹点附近设置旁路实现网络的旁路优化控制，从而将夹点技术应用于换热网络旁路优化控制中。实例仿真表明，这一旁路优化控制方法在满足控制要求的同时明显降低了网络的总公用工程，验证了其有效性。

关键词

换热网络　操作夹点　旁路优化控制

分类号

Operating pinch point analysis and bypass optimal control of heat exchanger networks

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Abstract

Pinch design method of heat exchanger networks(HEN)can be done for a specific operational condition, however the operational condition always fluctuates in a certain range.During practical process operation, it is often difficult to implement optimal control, since operating pinch point and the minimum temperature difference deviate from the design values.Therefore the study of pinch technology and the bypass optimal control of HEN have caught more attention, but integration of pinch technology with HEN optimal control is still not well established.The operating pinch point was studied for a given HEN, and the change of operating pinch point was qualitatively analyzed.Bypass optimal control was proposed and the bypasses were placed around the operating pinch point.Through the bypass optimal control of HEN, to which pinch point technology was applied, the total utility cost was minimized, and at the same time the commands on control performance could be reached, which was shown by the simulation of a heat exchanger network.

Key words

heat exchanger networks　pinch　bypass optimal control

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