

过程系统工程

基于催化剂颗粒停留时间分布的双峰聚乙烯牌号切换优化

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摘要

针对环管-流化床串联的Borstar双峰聚乙烯工艺,建立了包括催化剂切换在内的双反应器串联牌号切换模型,使产品牌号的切换时间最短、过渡料数量最少。同时,推导了双反应器串联工艺中,存在催化剂切换时各反应器内聚合物的瞬时与累积性能指标(熔融指数与密度)的模型。研究表明,对于涉及催化剂切换的牌号切换,最优策略是采用催化剂分步进料方式,综合考虑新旧催化剂对操作参数的不同要求及各反应器内残留原催化剂比重对最终产品性能的影响,从而达到明显缩短切换时间、有效抑制操作变量急剧变化、平缓产品性质变化轨迹的优化目的。

关键词

[双峰聚乙烯](#) [牌号切换](#) [催化剂切换](#) [停留时间分布](#) [优化](#)

分类号

Optimal grade transition based on residence time distribution of catalyst particles in bimodal polyethylene production process

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Abstract

The Borstar technology contains a loop reactor and a fluidized bed reactor connecting in series. Aiming at minimizing the grade transition time and the quantity of off-specification product, a grade transition model involving catalyst changeover was presented for this process. Meanwhile, the models of instantaneous and cumulative polyethylene properties, including melt index and polymer density in each reactor, were presented for the tanks-in-series process involving catalyst changeover. The results showed that if grade transition involved catalyst changeover, the recommended optimal strategy was to feed new catalyst step by step. Further more, it is necessary to consider the respective demands for manipulated variable profiles by old and new catalysts and the effect of old catalyst mass fraction on resin properties in each reactor. In this way, the transition time was remarkably reduced, the sharp fluctuation of manipulated variables was restrained and the profiles of polymer properties were smoothed up.

Key words

[bimodal polyethylene](#) [grade transition](#) [catalyst changeover](#) [residence time distribution](#) [optimization](#)

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