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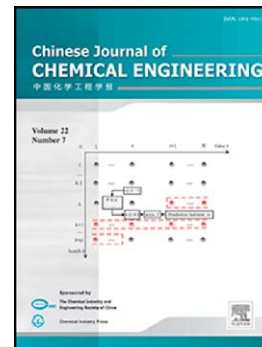
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Coupled Simulation of Recirculation Zonal Firebox Model and Detailed Kinetic Reactor Model in an Industrial Ethylene Cracking Furnace

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Abstract

A coupled system simulating both firebox and reactor is established to study the naphtha pyrolysis in an industrial tubular furnace. The firebox model is based on zone method including combustion, radiation, and convection to simulate heat transfer in the furnace. A two-dimensional recirculation model is proposed to estimate the flow field in furnace. The reactor model integrates the feedstock reconstruction model, an auto-generator of detail kinetic schemes, and the reactor simulation model to simulate the reaction process in the tubular coil. The coupled simulation result is compared with industrial process and shows agreement within short computation time.

Keywords: ethylene cracking; coupled simulation; tubular furnace; recirculation zone modeling; detailed reaction kinetic.

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