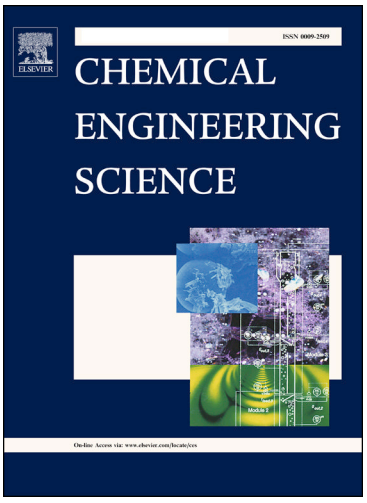

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Evolution of mass distribution in walls of rigid polyurethane foams

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Abstract

In this work, we describe a theoretical model for the simulation of reactive foaming of polyurethane (PU) consisting of three parts – reaction kinetics, foam expansion and wall evolution, which are coupled together. The advantage of this approach is that it provides comprehensive details about the development of PU foam – from the evolution of temperature and foam density to morphology features like bubble size, wall thickness and strut shape at the same time. The performance of the model is evaluated by analysing the model predictions for realistic process conditions and comparing to experimental data. It is demonstrated that the increased viscosity of the reaction mixture will lead to foams with thicker walls. The presented model can serve as a useful tool for the optimization of PU foaming process.

Keywords: Foams, Foaming process, Mathematical modelling, Foam morphology, Wall thickness, Struts

1. Introduction

Owing to the heat insulation and mechanical properties, polyurethane (PU) foams are widely used in construction, automotive and other industries. The

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