Spatio-Temporal Effects in Anaerobic Digestion of Solid Waste

Hermann J Eberl

Department of Mathematics and Statistics,
University of Guelph,
Canada

Abstract

Anaerobic digestion of solid waste is a rather slow process. In laboratory reactors and land-fill sites it can take many days or even several years, which makes experimental studies very difficult. In our talk we disucss a generalisation of a dynamic mathematical model that was recently suggested by Vavilin *et al.* (Water Research, 36:2405-2409, 2002). It is a semi-linear system of diffusion-reaction equations, formulated for the dependent variables waste density, volatile fatty acids, methanogenic biomass, and methane concentration. Our focus is on a spatio-temporal effect, the spreading of so-called methanogenic pockets. These are regions in which methanogenic biomass is growing much faster than in their immediate neighborhood (where it may even decay). We will address the analysis of the transient dynamics of the model, comment on computational techniques that utilise special model properties and finally we present an application in a numerical experiment.