

Production flows as many particle systems: Data, heuristics and first principles

Dieter Armbruster
Department of Mathematics, Arizona State University

July 15, 2004

Abstract

We model high volume, multi stage continuous production flows using a continuous density variable to model production volume and a continuous completion variable to denote production stages. Ideas from traffic modeling and gas dynamics are adapted to generate a hierarchy of PDE models. All of these models are variations of nonlinear nonlocal hyperbolic conservation laws. Comparisons to large scale discrete event simulations based on an INTEL factory and to actual (though sanitized) production data to parametrize those PDEs are made to determine state equations and diffusion coefficients. Control problems are identified and discussed.