Karlstad Applied Analysis Seminar (2021)

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Multiscale mathematical model of tumor growth in static vascular environment

Abstract

Tumor growth depends on several factors such as oxygen concentration, cell reproduction, movement, death and vascular environment. We present a multiscale model based on [LMJ17] and [Owe+11], modeling cells as stochastic agents in continuous space and mean- eld models for oxygen and extracellular concentrations on a lattice. Furthermore, cell movement is modeled via Brownian motion which a ects other intracellular concentrations. It is extended with mean- eld concentration by evolving cell densities in the discrete domain. To model the oxygen evolution we consider a reaction-di usion PDE with mean- eld cell densities as a sink. Finally, results are evaluated using a coupled stochastic/deterministic approach based on [LMS17] and [RS11] reducing variance on a post-processing stage.