

**Danielle Hilhorst**

**Focus session 12: Free boundaries in mathematical biology**

*A nonlinear parabolic-hyperbolic system for contact inhibition of cell-growth*

We consider a tumor growth model involving a nonlinear system of partial differential equations which describes the growth of two types of cell population densities with contact inhibition. In one space dimension, it is known that global solutions exist and that they satisfy the so-called segregation property: if the two populations are initially segregated - in mathematical terms this translates into disjoint supports of their densities - this property remains true at all later times. We apply recent results on transport equations and regular Lagrangian flows to obtain similar results in the case of arbitrary space dimension.

**Danielle Hilhorst and Hideki Murakawa**

**Focus session 16: Reaction-diffusion equations**

*A fast precipitation and dissolution limit for a reaction-diffusion system arising in porous medium*

We consider a three component reaction-diffusion system which models reactive transport in a cement based material where one mineral and two aqueous species react according to a kinetic law. We analyse the asymptotics of the reaction-diffusion model as the reaction rate becomes infinite. The singular limit turns out to have the form of a Stefan free boundary problem.