Constructing tools for describing tissue dynamics

I will discuss tissue growth dynamics in simple geometries, introducing the notion of homeostatic pressure. I will first show that when two tissues compete for space, in the absence of chemical signaling, the one, which has the largest homeostatic pressure, always win. I will subsequently introduce dynamical equations, which exhibit fluid like behavior on time scales long compared to duplication and apoptosis times, in the vicinity of homeostatic conditions. Results concerning cell diffusion behavior will be compared to 3d simulations. I will eventually show that in order for a micro-tumor to grow it must exceed a critical radius and calculate the probability for a tumor to exceed that radius. Boundary effects and orders of magnitudes will also be discussed.

M. Basan, T. Risler , JF Joanny, X Sastre-Garau, J Prost,
Homeostatic competition drives tumor growth and metastasis nucleation
HFSP Journal (2009).
J. Ranft, J.F. Joanny, F. Julicher, J. Prost, in preparation.
J. Elgeti, M. Basan, J. Prost, J.F. Joanny in preparation