

Lecture 7, Tu., Feb. 6, 2007

Reading homework: Gatenby, R. A., and Gawlinski, E. T. A reaction-diffusion model of acid-mediated invasion of normal tissue by neoplastic tissue. *Cancer Res.*, 56: 5745-5753, 1996.

We covered the biological background, assumptions and the implications of the mathematical and computational findings of the above paper. We will cover the mathematical tools needed to perform a systematic analysis of the model and explore alternative and possibly more mechanistic models in the next week.

EXERCISES DUE on TH., Feb. 22

(1). Reproduce the Figure 2 and Figure 4 in Nagy (2004) (*Bull. Math. Biol.*, 66, 663-687). The following Matlab files maybe useful.

Here is the Tumor1.m file describing the model

```
-----  
function dydt = Tumor1(t,y)  
%Vector field for cancer model 1  
global time IC A B ch1 ch2 sigma r xi alpha beta ga de  
%Calculate Phi  
c = (95*y(1))./(1.625 + y(1));  
G = (A * c.^2) ./ (ch1^2 + c.^2);  
D = B * (1 - (sigma * (c.^2)) ./ (ch2^2 + c.^2));  
Phi = G - D;  
%-----  
%Calculate \Psi  
Psi = alpha * r * c;  
Psi = Psi * exp(-xi * c);  
Psi = Psi - beta;  
%-----  
%Define the vector field  
dydt = [ ga*y(2) - y(1)*(Phi + de*y(1))  
          (Psi - Phi) * y(2) ];  
-----
```