1056-92-531 **Shantia Yarahmadian*** (syarahmadian@math.msstate.edu), **Sidney L. Shaw**, **Kevin Zumbrun** and **Blake Barker**. *Existence and stability of steady states of a reaction convection diffusion equation modeling microtubule formation.* Preliminary report.

We have generalized the Dogterom-Leibler model for microtubule dynamics to the case where the rates of elongation as well as the lifetimes of the elongating and shortening phases are a function of GTP-tubulin concentration. Using this model, we study the stability of the end-sates by looking at the boundary conditions. We also study the effect of nucleation rate in the form of convection term in the complex stability of the system which leads to new steady-states. In addition, stability analysis studies, uses the Evans function framework as a new mathematical tool in the study of microtubules dynamic. The equations are:

$$\begin{aligned}
\frac{\partial p^+(x,t)}{\partial t} &= -\frac{\partial(\nu^+ p^+(x,t))}{\partial x} - f_+^- p^+(x,t) + f_-^+ p^-(x,t) + d\frac{\partial^2 p^+(x,t)}{\partial x^2}\\
\frac{\partial p^-(x,t)}{\partial t} &= \nu^- \frac{\partial p^-(x,t)}{\partial x} + f_+^- p^+(x,t) - f_-^+ p^-(x,t) + d\frac{\partial^2 p^-(x,t)}{\partial x^2}\\
\frac{\partial c(x,t)}{\partial t} &= -kc(x,t) + \nu^- p^-(x,t) - \nu^+ p^+(x,t) + D\frac{\partial^2 c(x,t)}{\partial x^2}.
\end{aligned}$$

In these equations, $c(x,t)$ represents the concentration of the free tubuline, k is the hypothetic nucleation rate, $f_-^+ = \omega c(x,t)$ and $\nu^+ = u^+ c(x,t)$. (Received September 11, 2009)