

1067-Z1-2293

Yuyu Peng* (yuyup@math.uci.edu), 3124 Verano Place, Irvine, CA 92617. *A Multiscale Gene Regulation Model: Mutual Inhibition Network in Epidermal Development.*

In biological systems, usually there are critical genes directly or indirectly control the differentiation and proliferation of cells. The population size is usually regulated by both cell secreted extra-cellular and intra-cellular molecules. Multiscale gene regulation models with single gene and double genes using hyperbolic PDEs are developed. By comparing the effects of periodic, single positive feedback and double negative feedbacks on maintaining stable cell populations and homeostasis of the system, we can show the important roles of gene regulation. We can demonstrate that robust size regulation can be achieved through a population level signal.s regulation. Hysteresis in the gene network, the balance between growth and differentiation in the cell populations are also investigated. The results hopefully can provide insight to the cause of uncontrolled proliferation and diseases including cancer. Combining with the experimental findings, we use the model to fill in the gaps of current biological knowledge and to provide an integrative view of the system. (Received September 22, 2010)