

1. Hasty *et al*, in Proc Nat Acad Sci USA 97: 2075 (2000), study the genetic switch of phage lambda. Their equation for a protein x that regulates the expression of its own gene is

$$\frac{dx}{dt} = \frac{\alpha x^2}{1 + 2x^2 + 5x^4} - \gamma x + 1$$

Use a graphical construction to investigate the number of steady states of this equation. When $\alpha = 50$, find the range of γ for which there is bistability, and compare your results with Fig 1 in their paper.