

Steady States in 2D gLV Equations

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Nondimensionalized 2D gLV equations are

$$\frac{dx_a}{dt} = x_a(\mu_a - x_a + M_{ab}x_b) \quad (1)$$

$$\frac{dx_b}{dt} = x_b(\mu_b - x_b + M_{ba}x_a) \quad (2)$$

and has three steady states at $(1, 0)$, $(0, \mu_b)$, and $(\frac{1-M_{ab}\mu_b}{1-M_{ab}M_{ba}}, \frac{\mu_b-M_{ba}}{1-M_{ab}M_{ba}})$. Taking $\mu_b = 1$, the following graph summarizes the stability of these three steady states.

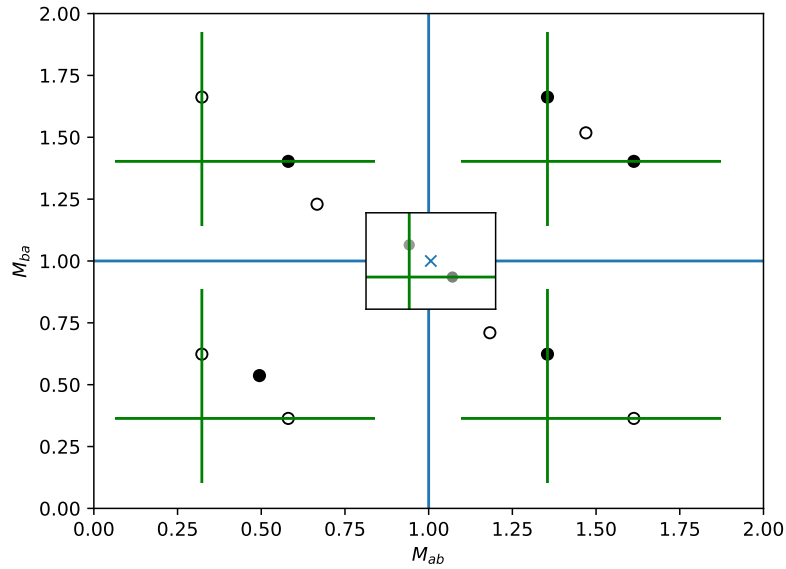


Figure 1: Four graphs of steady states are shown above, including their respective parameter ranges. Black dots shows stable steady state, and hollow dots shows unstable steady states.

The graph in the middle shows the limiting case where $M_{ab} = M_{ba} = 1$. The cross means both eigenvalues are 0, and gray dots means that one eigenvalue is 0 and the other is negative.