Lab 7 : Modelling strategic conflict between nations

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In this lab, we used Richardson's mathematical model of conflict to analyse strategic conflict between two nations. We analysed four cases : Mutual disarmament without grievance , Mutual disarmament with grievance , Unilateral disarmament and Arm race.

I. MODEL

Strategic conflict between two nations is captured by the following coupled equation.

$$\dot{x} = ky + g - \alpha x \tag{1}$$

$$\dot{y} = lx + h - \beta y \tag{2}$$

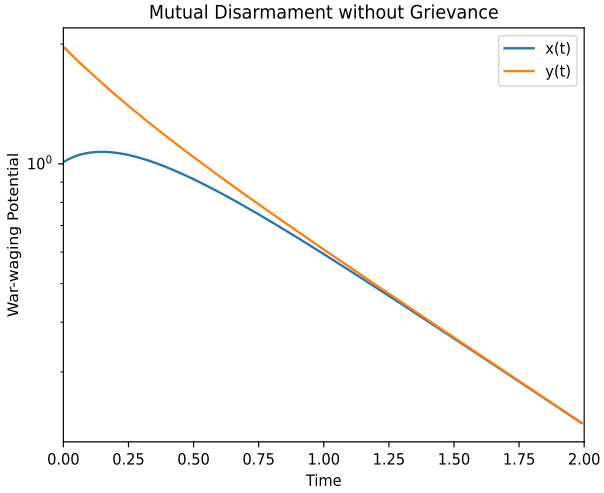

FIG. 2. plot of x *vs* t and y *vs* t with logarithmic scaling

II. RESULTS

A. Mutual disarmament without grievance

The parameters value are as following. $k = 2, l = 1, h = 0, g = 0, \alpha = 3, \beta = 2, x_0 = 1, y_0 = 2, \Delta t = 0.01$.

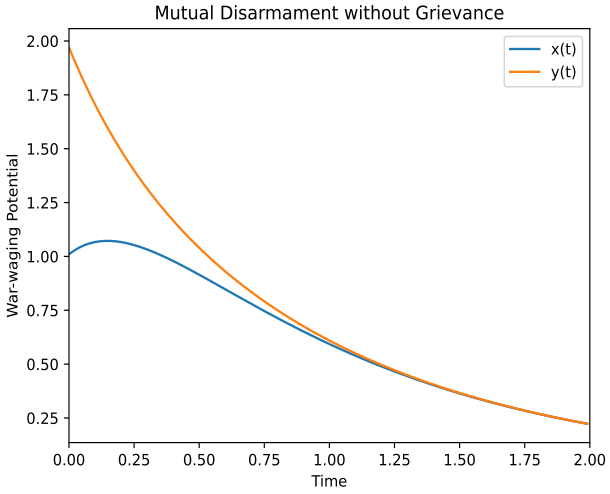

FIG. 1. plot of x *vs* t and y *vs* t with normal scaling

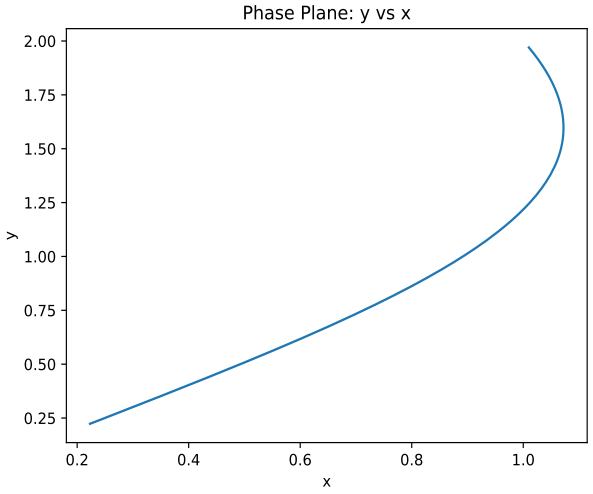

FIG. 3. plot of y *vs* x

B. Mutual disarmament with grievance

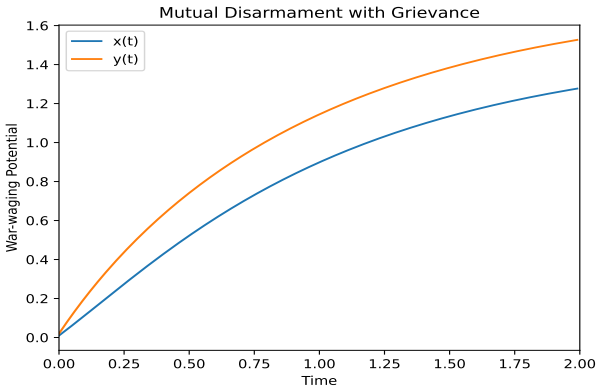

FIG. 4. Plot of $x(t)$ *vs* t and $y(t)$ *vs* t

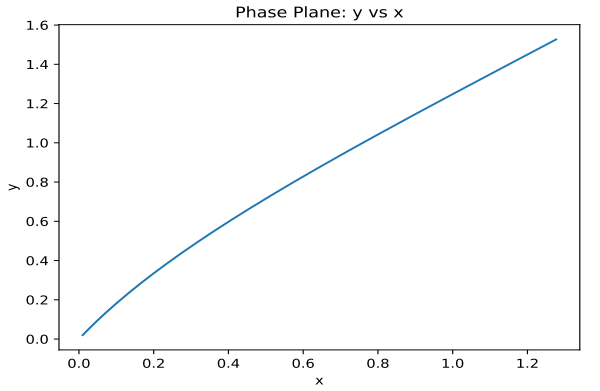

FIG. 5. Plot of y

C. Unilateral disarmament

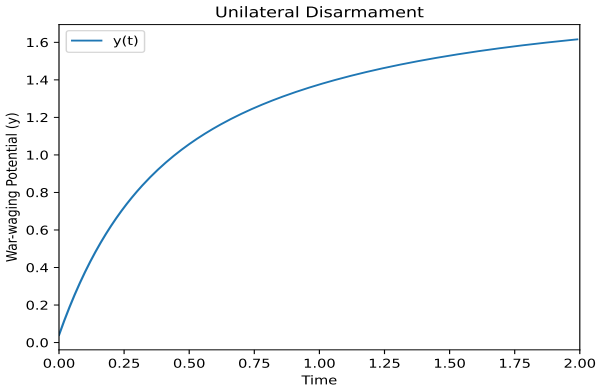

FIG. 6. Plot of y *vs* t

D. Arm race

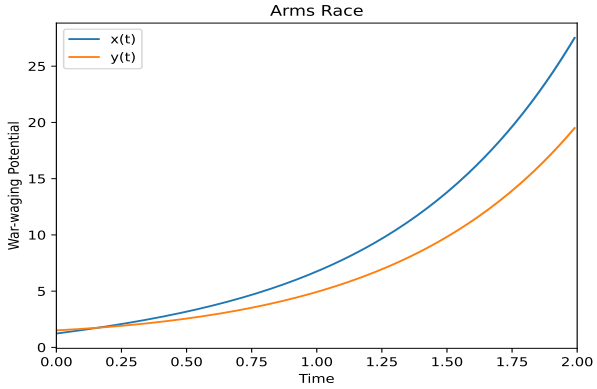

FIG. 7. plot of x *vs* t and y *vs* t with normal scaling

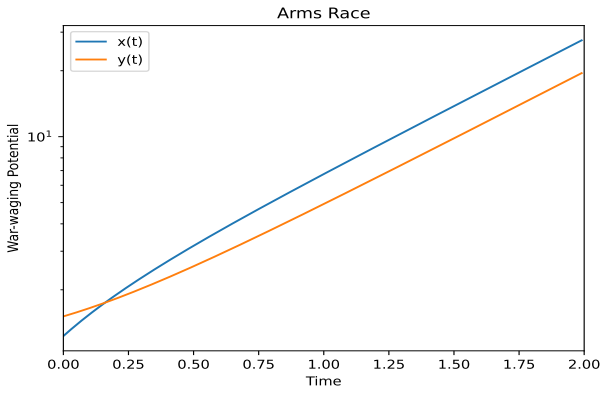

FIG. 8. plot of x *vs* t and y *vs* t with logarithmic scaling

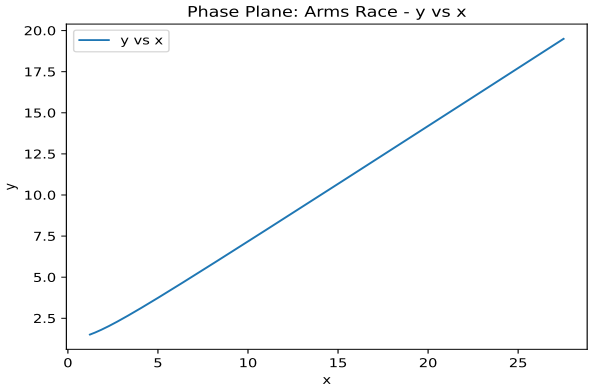

FIG. 9. Plot of y *vs* x