

Differential Equations

The system of equations representing the dynamics of normal humans ($H_n(t)$), brainwashed humans ($H_b(t)$), and aliens ($A(t)$), including brainwashing effects, is given by:

$$\frac{dH_n}{dt} = r_H H_n - \text{conversionRate} \cdot H_n \cdot A - \beta_n H_n \cdot A - \alpha_b H_n \cdot H_b$$

$$\frac{dH_b}{dt} = \text{conversionRate} \cdot H_n \cdot A - \beta_b H_b \cdot A - \alpha_n H_n \cdot H_b$$

$$\frac{dA}{dt} = -\gamma A + \text{slaveEffect} \cdot H_b \cdot A - \lambda A$$

Where: - $r_H H_n$ represents the natural growth of the normal human population. - $-\text{conversionRate} \cdot H_n \cdot A$ represents the brainwashing of normal humans by aliens. - $-\beta_n H_n \cdot A$ and $-\beta_b H_b \cdot A$ represent the combat death rates of normal and brainwashed humans, respectively, against aliens. - $-\alpha_b H_n \cdot H_b$ and $-\alpha_n H_n \cdot H_b$ represent mutual combat losses between normal and brainwashed humans. - $-\gamma A$ represents the environmental adaptation challenges faced by aliens. - $\text{slaveEffect} \cdot H_b \cdot A$ represents the reduction in alien death rates due to brainwashed humans aiding the aliens. - $-\lambda A$ represents alien deaths due to resistance from normal humans.

Constants and Their Meanings

- $r_H = 0.03$: Human population growth rate (birth rate).
- $\gamma = 0.00001$: Alien death rate due to environmental adaptation.
- $\lambda = 0.00002$: Alien death rate due to human resistance.
- $\beta_n = 0.001$: Death rate of normal humans in combat with aliens.
- $\beta_b = 0.002$: Death rate of brainwashed humans in combat with aliens.
- $\alpha_n = 0.0015$: Death rate of brainwashed humans due to normal humans.
- $\alpha_b = 0.0001$: Death rate of normal humans due to brainwashed humans.
- $\text{conversionRate} = 0.00003$: Rate at which aliens brainwash normal humans.
- $\text{slaveEffect} = 0.001$: Reduction in alien death rate due to brainwashed humans aiding aliens.

Initial Conditions and Simulation Details

- Initial normal human population: $H_{n0} = 500$.
- Initial brainwashed human population: $H_{b0} = 0$.
- Initial alien population: $A_0 = 50$.
- Time span: $t \in [0, 200]$ days.

Terms in the Equations

- $r_H H_n$: Growth rate of normal humans.
- $-\text{conversionRate} \cdot H_n \cdot A$: Brainwashing conversion of normal humans by aliens.
- $-\beta_n H_n \cdot A$: Losses of normal humans in combat with aliens.
- $-\beta_b H_b \cdot A$: Losses of brainwashed humans in combat with aliens.
- $-\alpha_b H_n \cdot H_b$: Deaths of normal humans in combat with brainwashed humans.
- $-\alpha_n H_n \cdot H_b$: Deaths of brainwashed humans in combat with normal humans.
- $-\gamma A$: Deaths of aliens due to environmental adaptation.
- $\text{slaveEffect} \cdot H_b \cdot A$: Reduction in alien death rate due to brainwashed humans aiding aliens.
- $-\lambda A$: Deaths of aliens due to resistance from normal humans.