Rate equation for loop growth

$$\frac{dC_i}{dt} = G_0 - \alpha(D_i + D_v)C_iC_v - \frac{D_iC_i}{\ln\left(\frac{8R_L}{r_0}\right)} \cdot 2\pi^2 N_L R_L$$

$$\frac{dC_v}{dt} = G_0 - \alpha(D_i + D_v)C_iC_v - \frac{D_vC_v}{\ln\left(\frac{8R_L}{r_0}\right)} \cdot 2\pi^2 N_L R_L$$

$$\frac{dR_L}{dt} = \Omega \frac{\pi}{b \ln\left(\frac{8R_L}{r_0}\right)} (D_iC_i - D_vC_v)$$