COVID-19 Model Containing Contact Tracing and Quarantine

1 Model Equations

$$S_{j+1} = S_j - S_j\alpha c\left(\frac{I_P + b_c I_C + b_a I_A}{N}\right) - (r\delta_E E_{j-4})q(1-\alpha)c(b_c(S_j + S_{j-1}) + (S_{j-2} + S_{j-3}))\frac{1}{N} \quad (1)$$

$$E_{j+1} = E_j - S_j\alpha c\left(\frac{I_P + b_c I_C + b_a I_A}{N}\right) - (r\delta_E E_{j-4})q\alpha c(b_c(S_j + S_{j-1}) + (S_{j-2} + S_{j-3}))\frac{1}{N} - \delta_E E_j \quad (2)$$

$$I_{P_{j+1}} = I_{Pj} + r\delta_E E_j - \delta_{I_P} I_{Pj} \quad (3)$$

$$I_{C_{j+1}} = I_{Cj} + \delta_{I_P} I_{Pj} + \delta_Q Q_j - \delta_{I_C} I_{Cj} \quad (4)$$

$$I_{A_{j+1}} = I_{Aj} + (1-r)\delta_E E_j - \delta_{I_A} I_{Aj} \quad (5)$$

$$Q_{j+1} = Q_j + (r\delta_E E_{j-4})cq\alpha r(b_c(S_j + S_{j-1}) + (S_{j-2} + S_{j-3}))\frac{1}{N} - \delta_Q Q_j \quad (6)$$

$$Q_{A_{j+1}} = Q_{A_j} + (r\delta_E E_{j-4})cq\alpha(1-r)(b_c(S_j + S_{j-1}) + (S_{j-2} + S_{j-3}))\frac{1}{N} - \delta_{Q_A} Q_{A_j} \quad (7)$$

$$S_{Q_{j+1}} = S_{Q_j} + (r\delta_E E_{j-4})q(1-\alpha)c(b_c(S_j + S_{j-1}) + (S_{j-2} + S_{j-3}))\frac{1}{N} - \delta_{S_Q} S_{Q_j} \quad (8)$$

$$R_{j+1} = R_j + \delta_{I_C} I_{C_j} + \delta_{I_A} I_{A_j} + \delta_{Q_A} Q_{A_j} \quad (9)$$

2 Parameters

Parameters have similar meaning to that of Miller model with a some additions.