Intensional infect proportion of susceptible

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Here is the system we are investigating:

$$\frac{\mathrm{d}S}{\mathrm{d}\tau} = \epsilon - \mathcal{R}_0 S(I_N + I_T) - \frac{p}{\gamma+\mu}S - \epsilon S \tag{1}$$
$$\frac{\mathrm{d}I_T}{\mathrm{d}\tau} = \frac{p}{\gamma+\mu}S + \mathcal{R}_0 S I_T - I_T \tag{2}$$
$$\frac{\mathrm{d}I_N}{\mathrm{d}\tau} = \mathcal{R}_0 S I_N - I_N \tag{3}$$
$$\frac{\mathrm{d}R}{\mathrm{d}\tau} = (1-\epsilon)(I_N + I_T) - \epsilon R \tag{4}$$

We are trying to find the endemic equilibrium. Specifically the I_N value at E.E. By letting (3) equal to 0, we should get $S = \frac{1}{\mathcal{R}_0}$, but when substituting into (2), we get $\frac{p}{\gamma+\mu}S = 0$, which is inconsistent with our simulation result. Result shows that all variables stabilizes when t is large enough.

Thus, with the help of our plot. Thus, it is possible to conclude that $S = \frac{1}{\mathcal{R}_0}$ is actually not the value of value of S at E.E.. Instead, $I_N = 0$ is actually the E.E., for all $p \neq 0$.