The Eigenvalues Trace vs. Time

The Red lines express the real values while the blue express the Imaginary values of the eigenvalues.
Loop 1:
Infectious_Population_I --> Infection_Rate
Loop 2:
Infectious_Population_I --> Recovery_Rate
Loop 3:
Susceptible_Population_S --> Infection_Rate

The Level of interest: Infectious_Population_I

As it can be seen from the graph above; only 4 time steps might be important to study:

a) 4.25
b) 9.375
c) 11.25
d) 21.125

Independent loops' elasticity values:

Time instant 4.25:
The dominant eigenvalue is: 0.97552, with percentage contribution: 100%.
Loop 1 (Polarity: 1): 1.5317
Loop 2 (Polarity: -1): -0.51904
Loop 3 (Polarity: -1): -0.012679

Time instant 9.375:
The dominant eigenvalue is: -0.057821-0.44189i, with percentage contribution: 100%.
Loop 1 (Polarity: 1): $5.5511\times10^{-17}+0.88436i$
Loop 2 (Polarity: -1): $0.5-0.50033i$
Loop 3 (Polarity: -1): $0.5-0.38403i$

Time instant 11.25:

The dominant eigenvalue is: $-0.29932-0.35468i$, with percentage contribution: 100%.
Loop 1 (Polarity: 1): $2.7756\times10^{-17}+0.46823i$
Loop 2 (Polarity: -1): $0.5-0.28291i$
Loop 3 (Polarity: -1): $0.5-0.18532i$

Time instant 21.125:

The dominant eigenvalue is: $-0.41219$, with percentage contribution: 100%.
Loop 1 (Polarity: 1): $-0.21419$
Loop 2 (Polarity: -1): $1.2197$
Loop 3 (Polarity: -1): $-0.0054762$

Independent loops' elasticity values (Sorted):

Time instant 4.25:

The dominant eigenvalue is: $0.97552$, with percentage contribution: 100%.
Loop 1 (Polarity: 1): $1.5317$
Loop 3 (Polarity: -1): $-0.012679$
Loop 2 (Polarity: -1): $-0.51904$

Time instant 9.375:

The dominant eigenvalue is: $-0.057821-0.44189i$, with percentage contribution: 100%.

Effect on the Envelope:
Loop 1 (Polarity: 1): $0.87688$
Loop 3 (Polarity: -1): $-0.44566$
Loop 2 (Polarity: -1): $-0.56097$

Effect on the Frequency:
Loop 1 (Polarity: 1): $-0.11474$
Loop 2 (Polarity: -1): $-0.43086$
Loop 3 (Polarity: -1): $-0.44595$
Time instant 11.25:

The dominant eigenvalue is: $-0.29932 - 0.35468i$, with percentage contribution: 100%.

Effect on the Envelope:

Loop 1 (Polarity: 1): 0.35784
Loop 3 (Polarity: -1): -0.4641
Loop 2 (Polarity: -1): -0.53868

Effect on the Frequency:

Loop 2 (Polarity: -1): -0.19966
Loop 3 (Polarity: -1): -0.2626
Loop 1 (Polarity: 1): -0.30198

Time instant 21.125:

The dominant eigenvalue is: $-0.41219$, with percentage contribution: 100%.

Loop 2 (Polarity: -1): 1.2197
Loop 3 (Polarity: -1): -0.0054762
Loop 1 (Polarity: 1): -0.21419