Neglecting the nonlinear terms in Eqs. (21), we obtain the linear system
\[
\frac{d}{dt} \begin{pmatrix} x \\ y \end{pmatrix} = \begin{pmatrix} 1 & 0 \\ 0.5 & 0 \end{pmatrix} \begin{pmatrix} x \\ y \end{pmatrix},
\]
which is valid near the origin. The eigenvalues and eigenvectors of the system (22) are
\[
r_1 = 1, \quad \xi^{(1)} = \begin{pmatrix} 1 \\ 0 \end{pmatrix}; \quad r_2 = 0.5, \quad \xi^{(2)} = \begin{pmatrix} 0 \\ 1 \end{pmatrix},
\]
so the general solution is
\[
\begin{pmatrix} x \\ y \end{pmatrix} = c_1 \begin{pmatrix} 1 \\ 0 \end{pmatrix} e^t + c_2 \begin{pmatrix} 0 \\ 1 \end{pmatrix} e^{0.5t}.
\]
Therefore the origin is an unstable node of the linear system (22) and also of the nonlinear system (21). All trajectories leave the origin tangent to the y-axis except for one trajectory that lies along the x-axis.

The corresponding linear system is
\[
\frac{d}{dt} \begin{pmatrix} u \\ v \end{pmatrix} = \begin{pmatrix} -1 & -1 \\ 0 & -0.25 \end{pmatrix} \begin{pmatrix} u \\ v \end{pmatrix}.
\]