Flow-Induced Inertial Steady Vector Field Topology – Additional Material

Critical Points in 2D

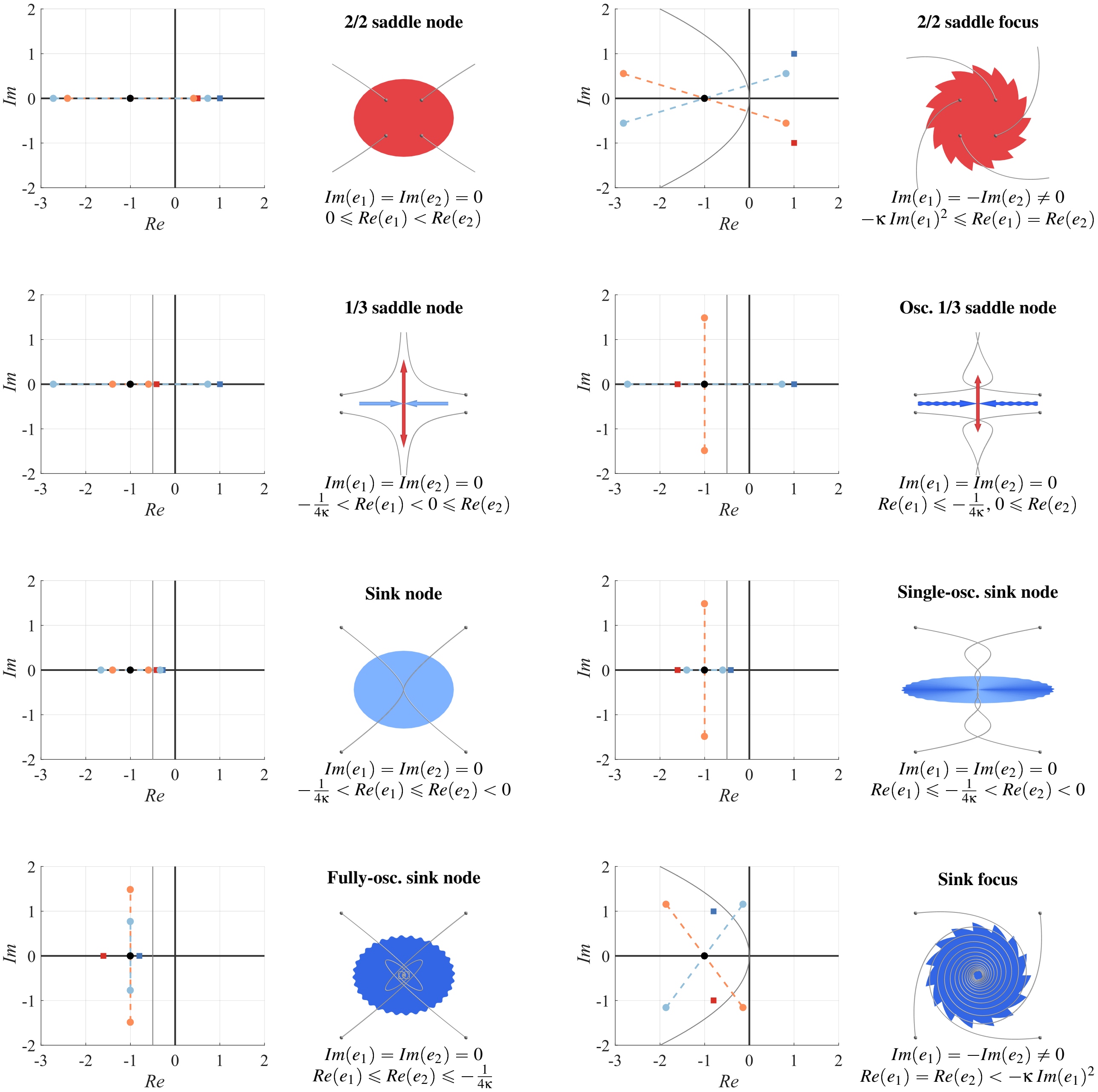

Figure 1: Classification of inertial critical points based on the eigenvalues e_1, e_2 of $\mathbf{K}$. W.l.o.g., we assume that $Re(e_1) \leqslant Re(e_2)$. The eigenvalue e_1 (■) belongs to the eigenvalues $f_{1,1}, f_{1,2}$ (●) of $\tilde{\mathbf{J}}$, and the eigenvalue e_2 (■) belongs to the eigenvalues $f_{2,1}, f_{2,2}$ (●). Each pair of eigenvalues $f_{i,1}, f_{i,2}$ is located diametrically opposite around the real-valued constant center $-1/(2\kappa)$ (●), here shown for $\kappa = 0.5$. For each possible case, we show the eigenvalues in the complex plane and the corresponding eigenvalue conditions.

Critical Points in 3D (1/2)

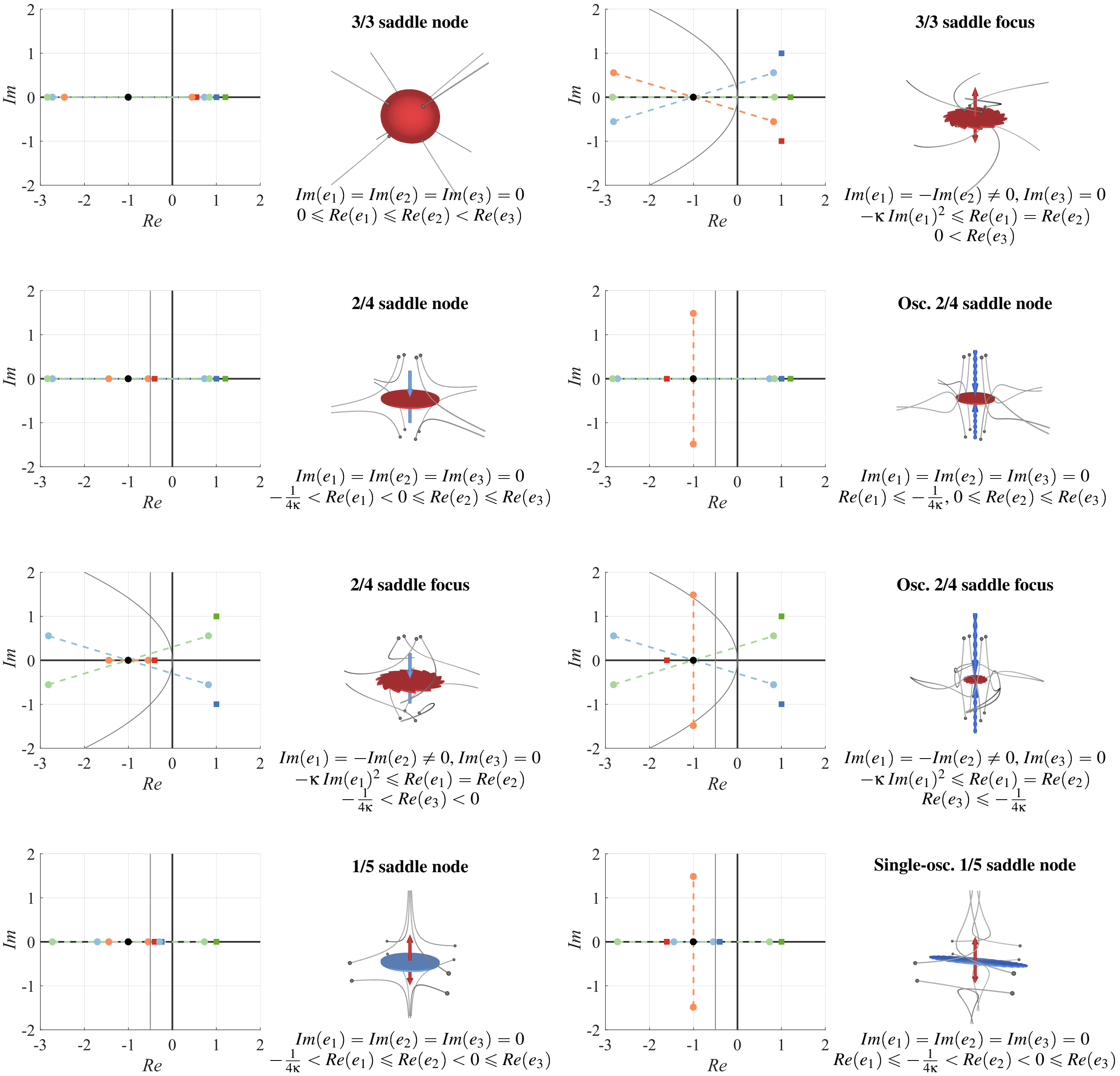

Figure 2: Classification of inertial critical points based on the eigenvalues e_1, e_2, e_3 of $\mathbf{K}$. The eigenvalue e_1 (■) belongs to the eigenvalues $f_{1,1}, f_{1,2}$ (●) of $\tilde{\mathbf{J}}$, the eigenvalue e_2 (■) belongs to the eigenvalues $f_{2,1}, f_{2,2}$ (●) and the eigenvalue e_3 (■) belongs to the eigenvalues $f_{3,1}, f_{3,2}$ (●). Each pair of eigenvalues $f_{i,1}, f_{i,2}$ is located diametrically opposite around the real-valued constant center $-1/(2\kappa)$ (●), here shown for $\kappa = 0.5$. For each possible case, we show the eigenvalues in the complex plane and the corresponding eigenvalue conditions.

Critical Points in 3D (2/2)

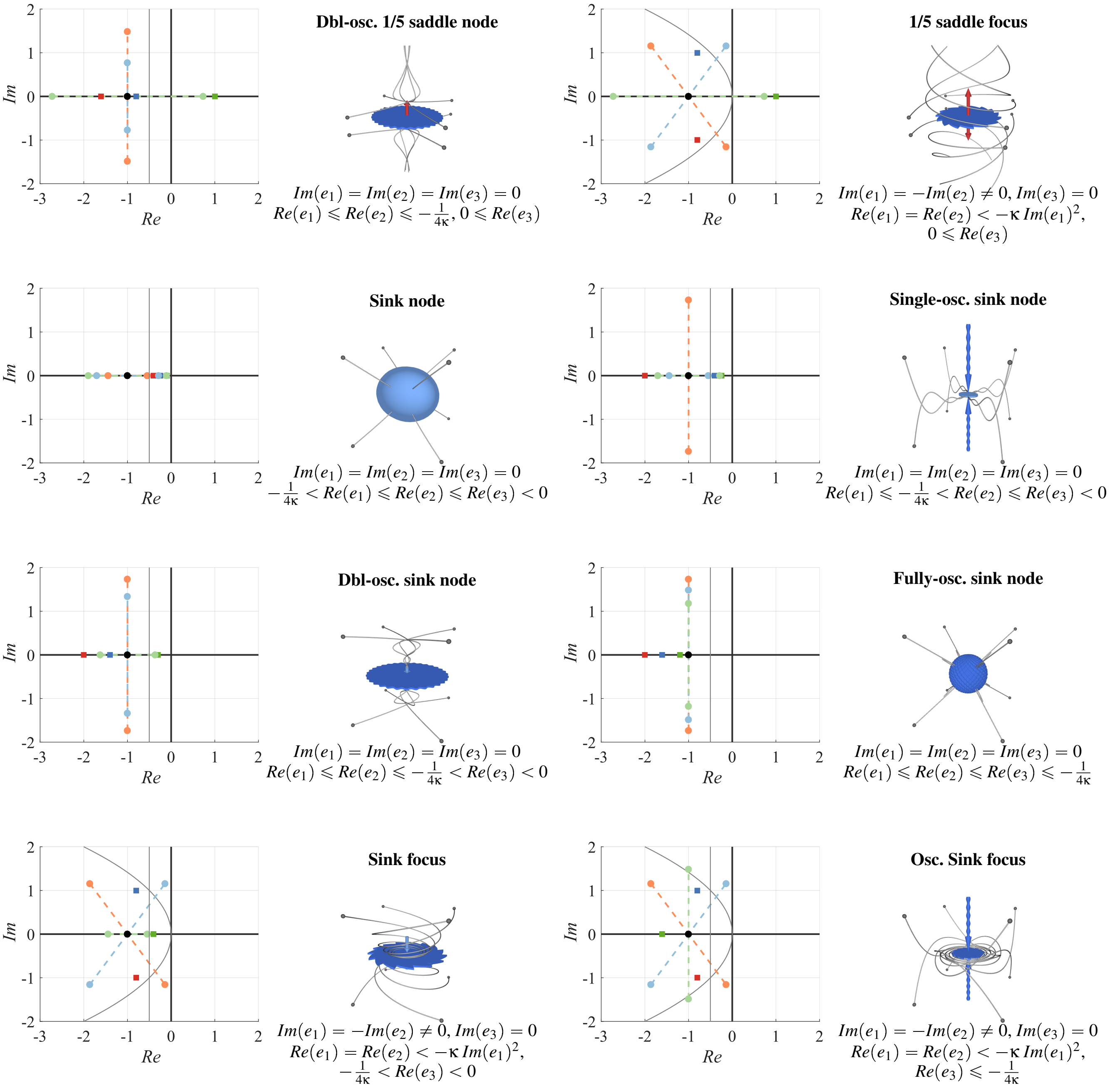

Figure 3: Classification of inertial critical points based on the eigenvalues e_1, e_2, e_3 of $\mathbf{K}$. The eigenvalue e_1 (■) belongs to the eigenvalues $f_{1,1}, f_{1,2}$ (●) of $\tilde{\mathbf{J}}$, the eigenvalue e_2 (■) belongs to the eigenvalues $f_{2,1}, f_{2,2}$ (●) and the eigenvalue e_3 (■) belongs to the eigenvalues $f_{3,1}, f_{3,2}$ (●). Each pair of eigenvalues $f_{i,1}, f_{i,2}$ is located diametrically opposite around the real-valued constant center $-1/(2\kappa)$ (●), here shown for $\kappa = 0.5$. For each possible case, we show the eigenvalues in the complex plane and the corresponding eigenvalue conditions.