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 $K$. W.l.o.g., we assume that $\text{Re}(e_1) \leq \text{Re}(e_2)$. The eigenvalue $e_1$ (*) belongs to the eigenvalues $f_{1,1}, f_{1,2}$ of $\tilde{J}$, and the eigenvalue $e_2$ (*) belongs to the eigenvalues $f_{2,1}, f_{2,2}$ (*). Each pair of eigenvalues $f_{1,1}, f_{1,2}$ 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.

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Critical Points in 3D (1/2)

Figure 2: Classification of inertial critical points based on the eigenvalues $e_1, e_2, e_3$ of $K$. The eigenvalue $e_1 (\bullet)$ belongs to the eigenvalues $f_{1,1}, f_{1,2}$ (•) of $J$, the eigenvalue $e_2 (\bullet)$ belongs to the eigenvalues $f_{2,1}, f_{2,2}$ (•) and the eigenvalue $e_3 (\bullet)$ 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 $K$. The eigenvalue $e_1$ (■) belongs to the eigenvalues $f_{1.1}, f_{1.2}$ (●), 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.