

$$\frac{d}{dt} \begin{bmatrix} \mathbf{p} \\ \mathbf{q} \end{bmatrix} = \begin{bmatrix} \mathbf{f}(\mathbf{q}, t) \\ \mathbf{g}(\mathbf{p}) \end{bmatrix} \quad \text{with continuous functions} \quad \begin{array}{l} \mathbf{f} : \mathbb{R}^n \times \mathbb{R} \rightarrow \mathbb{R}^n, \\ \mathbf{g} : \mathbb{R}^n \rightarrow \mathbb{R}^n. \end{array} \quad (11.10.1)$$