Local bifurcations of equilibria of dynamical systems; Hamiltonian case

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Abstract   The presentation will be divided into two parts. To start with we consider a parameter dependent dynamical system $\dot{x}(t) = f(x(t), \alpha)$, $x(0) = x_0$. where $f \in C^\infty(\mathbb{R}^{m+k}; \mathbb{R}^m)$. and its generic local bifurcations for $k = 1, 2$. In particular we present some proposed techniques for building determining functions for the bifurcations. The aim is to present some general concepts and techniques associated with bifurcation analysis in a rather elemntary level.

Secondly we consider the special case of Hamiltonian systems where $f(x, \alpha) = Jh_{xx}(x, \alpha)$ for some $h \in C^\infty(\mathbb{R}^{2n+k}; \mathbb{R}^{2n})$. We reflect the necessary alterations in the techniques in this case. At the end of the presentation the numerical implementation of the bifurcations analysis will be shortly touch upon.