Continuation of codimension 2 equilibrium bifurcations in

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Abstract

In this talk, we discuss recent extensions to CONTENT, an interactive software package developed at CWI (Amsterdam) by Yu. A. Kuznetsov and V. V. Levitin, to compute and pathfollow numerically all codimension 2 bifurcations of the solutions of the equilibrium equations $F(u,\alpha) = 0$ associated with the dynamical system

$$\dot{u} = F(u, \alpha) \qquad u, F(u) \in \mathbb{R}^n, \alpha \in \mathbb{R}^m \ .$$

We will deal with Bogdanov-Takens points (BT), Zero-Hopf points (ZH), Double Hopf points (DH) and Generalized Hopf points (GH) which can be found while following a curve of single Hopf points and also with cusp points (CP) that can be found on limit point curves. Also, detection of several codimension 3 bifurcations will be discussed.

We illustrate the use of this software with several model computations for all types of the above mentioned bifurcations. One of the presented models is a realistic model of a neuron, developed at Cornell University by J. Guckenheimer and coworkers.