

Degenerate Bogdanov-Takens bifurcations in two and more dimensions.
Yuri A. Kuznetsov (Utrecht University)

Equilibria of ODEs with a double zero eigenvalue will be considered, when one of the coefficients of the classical Bogdanov normal form vanishes. A short summary of known results on bifurcations of phase portraits in generic planar cases will be given.

Then the case of a "triple equilibrium with an elliptic sector" will be revisited. It will be shown numerically that this case is unexpectedly similar to the much better studied "triple focus case", and give a planar ODE describing the age-structured population dynamics, where a transition between the focus case and the elliptic case occurs.

Explicit formulas for the critical normal form coefficients of order 2, 3, and 4 on the 2D center manifold will then be derived for the general n-dimensional ODEs using the combined reduction-normalization technique. These formulas are equally suitable for numeric and symbolic computation of the normal form coefficients at the degenerate Bogdanov-Takens bifurcations, as will be illustrated by the analysis of a 6D ODE with a discrete symmetry describing two coupled Faraday disk homopolar dynamos.