Bifurcation values of polynomial mappings

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Abstract: If a value of a proper smooth map is regular, then the map is a smooth fibration over some neighbourhood of the value. Yet, it is not necessarily true without assumption of properness. Note that the infimuum of a real function, for instance the Broughton polynomial, does not need to be attained, yet it is clear that there is no fibration near such value.

In the mini-course we will present conditions and properties in the algebraic setting of the set of bifurcation values, which is the complement of the set of values over which the map is a smooth fibration.

Contents:

0) Definition of bifurcation points for a polynomial mapping

1) Generalized Malgrange condition and the Rabier Theorem

2) How to compute the generalized bifurcation points at infinity for a complex polynomial

3) How to compute the genaralized bifurcation points at infinity in a general smooth case

4) How to compute the genaralized bifurcation points at infinity in a non-smooth case

5) Application in optimization theory

References:

Jelonek, Zbigniew; Tibăr, Mihai. *Bifurcation locus and branches at infinity of a polynomial (…).* Math. Ann. 361 (2015), no. 3-4, 1049–1054.

Jelonek, Zbigniew; Kurdyka, Krzysztof. *Quantitative generalized Bertini-Sard theorem for smooth affine varieties.* Discrete Comput. Geom. 34 (2005), no. 4, 659–678.

Jelonek, Zbigniew. *On asymptotic critical values and the Rabier theorem.* Banach Center Publ., 65 Polish Academy of Sciences, Institute of Mathematics, Warsaw, 2004, 125–133.

Jelonek, Zbigniew; Kurdyka, Krzysztof. *On asymptotic critical values of a complex polynomial.* J. Reine Angew. Math. 565 (2003), 1–11.

Jelonek, Zbigniew. *On the generalized critical values of a polynomial mapping.* Manuscripta Math. 110 (2003), no. 2, 145–157.