Newton polytopes of stably coercive polynomials and related coercivity concepts

Tomáš Bajbar[1] and Oliver Stein[2]

We introduce the stable coercivity property on $\mathbb{R}^n$ for multivariate polynomials $f \in \mathbb{R}[x]$ and analyze it in terms of their Newton polytopes. For so-called gem regular polynomials we characterize their stable coercivity via four conditions solely containing information about the geometry of the vertex set of the Newton polytope at infinity, as well as sign conditions on the corresponding polynomial coefficients. For gem regular polynomials, it turns out, that these four conditions are equivalent to a special global growth-type condition being satisfied. For all other polynomials, the so-called gem irregular polynomials, we introduce some sufficient conditions for stable coercivity based on those from the regular case. Finally we analyze the relationship between the stable coercivity and the order of coercivity.

[1]Institute of Operations Research, Karlsruhe Institute of Technology (KIT), Germany, bajbar@kit.edu

[2]Institute of Operations Research, Karlsruhe Institute of Technology (KIT), Germany, stein@kit.edu