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Convexifying positive polynomials and a proximity algorithm

We prove that if f is a positive C^2 function on a convex compact set X then it becomes strongly convex when multiplied by (1+|x|^2)^N with N large enough. For f polynomial we give an explicit estimate for N, which depends on the size of the coefficients of f and on the lower bound of f on X. As an application of our convexification method we propose an algorithm which for a given polynomial f on a convex compact semialgebraic set X produces a sequence (starting from an arbitrary point in X) which converges to a (lower) critical point of f on X. The convergence is based on the method of talweg which is a generalization of the Lojasiewicz gradient inequality. (Joint work with S. Spodzieja).

Presenter: Mr KURDYKA, Krzysztof (Université de Savoie)