The degree of the central curve in quadratic programming

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Abstract

For convex optimization problems, such as linear, quadratic, or semidefinite programming, a class of interior point algorithms track the so-called central path to an optimal solution. The central curve, the Zariski closure of the central path, is an algebraic curve and it has been recently studied by De Loera, Sturmfels, and Vinzant (DSV) in the linear case. In particular, the degree of the central curve for linear programming has been computed, and this has implications for the complexity of the interior point algorithms. We tackle the next case, the degree of the central curve for quadratic programming. We prove a formula for this degree and re-prove DSV formula in the linear programming case with different tools. Also, in the "diagonal case", we construct a Groebner basis for the ideal defining the central curve.