The distance function from a real algebraic variety

Abstract:

The Euclidean distance function from a conic was computed by means of invariant theory in XIX century. The distance function from the variety of corank one matrices was computed independently by Beltrami and Jordan a few years later and gave rise to the Singular Value Decomposition. Today this function is the core of engineering applications, like "offset surfaces".

More generally, the distance function from a real algebraic variety is a root of an algebraic function.

Having in mind applications to the spectral theory of tensors, we show a duality property of this function and we describe its lowest and highest coefficients. We show how this fits in the ED philosophy, where ED stands for "Euclidean Distance".