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## Solving by duality by Bernard Mourrain

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Abstract. Finding the common roots of a set of polynomial equations is a problem that appears in many contexts and applications. Standard approaches for solving this difficult question, such as Grobner bases, border basis, triangular sets, etc. are based on polynomial reductions but their instability against numerical approximations can be critical. In this talk, we will describe a dual approach which focuses on linear functionals vanishing at the roots. We will review the properties of Truncated Normal Forms, the connexion with classical computer algebra approaches and resultants. We will also detail the dual approach in the context of optimisation problems and for analysing isolated singularities. Examples from geometric modeling, robotics and tensor decomposition will illustrate the numerical behavior of these dual methods.