

Real Smooth Points

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Many algorithms for determining properties of real algebraic or semi-algebraic sets rely upon the ability to compute smooth points. In this talk, I present a simple procedure based on computing the critical points of some well-chosen function that guarantees the computation of smooth points in each connected bounded component of a real atomic semi-algebraic set. Our technique is intuitive in principal, performs well on previously difficult examples, and is straightforward to implement using existing numerical algebraic geometry software. I also present the application of our method to design an efficient algorithm to compute the real dimension of algebraic sets, the original motivation for this research. This work is in collaboration with Katherine Harris and Jonathan Hauenstein.