

Polyhedral computations in polynomial system solving

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Mixed cell enumeration is an important step in polynomial system solving when the polyhedral homotopy method is used. We illustrate how also the related problems of mixed volume computation and intersection of (non-generic) tropical hypersurfaces have applications in polynomial system solving. We show how the first problem can be solved via a tropical version of the numerical homotopy method and how isolated points of the second problem also may be found by the tropical homotopy method, while higher-dimensional faces are found by a non-generic version of a mixed cell enumeration. We discuss how dynamic decomposition of the tropical hypersurfaces may narrow the enumeration tree and mention a few lower-level tricks that make our implementation faster.