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Harbourne–Huneke Containment and Bounds on Waldschmidt Constant.

In order to provide a counterexample to Hilbert’s 14th problem, Nagata raised a question: Given a finite set of points $X = \{P_1, \dots, P_s\} \subset \mathbf{P}_{\mathbb{C}}^N$ what is the minimal degree, $\alpha_x(m)$ of a hyper-surface that passes through the points with multiplicity at least m ? Chudnovsky provided a conjectural answer to the above question involving a lower bound of the Waldschmidt constant of the ideal corresponding to the points. Later on Demailly generalized the bound. The approach we use is via stable containment. Harbourne and Huneke gave containment conjectures which give positive answers to the above-mentioned conjectures. We study stable versions of that containment and as a consequence, we get positive answers to Chudnovsky and Demailly’s conjecture for a sufficiently large number of general points. In this talk, I will introduce Chudnovsky’s conjecture, Demailly’s conjecture, and the containment conjectures. I will also present the results from the joint work with Eloísa Grifo, Huy Tài Hà, and Thái Thành Nguyễn. (Received August 04, 2020)