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Chun-Yen Shen* (cyshen@math.msu.edu), Department of Mathematics, Michigan State University, East Lansing, MI 48824. *Algebraic methods in sum-product phenomena.*

We classify the polynomials $f(x, y) \in \mathbb{R}[x, y]$ such that given any finite set $A \subset \mathbb{R}$ if $|A + A|$ is small, then $|f(A, A)|$ is large. In particular, the following bound holds : $|A + A||f(A, A)| \gtrsim |A|^{5/2}$. The Bezout's theorem and a theorem by Y. Stein play important roles in our proof. This confirms a conjecture of V. Vu. (Received August 28, 2012)