1161-14-25   **Douglas A Torrance*** (`dtorrance@piedmont.edu`) and **Nick Vannieuwenhoven** (`nick.vannieuwenhoven@kuleuven.be`). *All secant varieties of the Chow variety are nondefective for cubics and quaternary forms.*

The Chow rank of a form is the length of its smallest decomposition into a sum of products of linear forms. For a generic form, this corresponds to finding the smallest secant variety of the Chow variety which fills the ambient space. We determine the Chow rank of generic cubics and quaternary forms by proving nondefectivity of all involved secant varieties. The main new ingredient in our proof is the generalization of a technique by [Brambilla and Ottaviani, On the Alexander–Hirschowitz theorem, J. Pure Appl. Algebra, 2008] that consists of employing Terracini's lemma and Newton's backward difference formula to compute the dimensions of secant varieties of arbitrary projective varieties. Via this inductive construction, the proof of nondefectivity ultimately reduces to proving a number of base cases. These are settled via a computer-assisted proof because of the large dimension of the spaces involved. The largest base case required in our proof consisted of computing the dimension of a vector space constructed from the 400th secant variety of a degree-82 Chow variety embedded in $\mathbb{P}^{98769}$. (Received July 23, 2020)