1086-14-1918   **Luke Oeding*** (`oeding@math.berkeley.edu`), Department of Mathematics, 970 Evans Hall, Berkeley, CA 94720, and **Giorgio Ottaviani**. *Eigenvectors of tensors and algorithms for Waring decomposition.*

A polynomial is said to have rank r if it can be written as a sum of r powers of linear forms. Waring's problem is to find this decomposition. While a naive algorithm exists, it is unlikely to succeed even in modest examples. One goal is to provide algorithms which succeed to decompose polynomials of low rank as quickly as possible. With Ottaviani we have developed new algorithms for Waring decomposition, which generalize Sylvester's algorithm for binary forms, using vector bundle techniques together with the notion of an eigenvector of a tensor. Despite their perhaps sophisticated appearance, our algorithms mainly consist of computations involving linear algebra and succeed to quickly decompose polynomials in a larger range of ranks than was previously available. I will explain these algorithms from the level of linear algebra and show their implementation in Macaulay 2. (Received September 24, 2012)