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Bernadette M Boyle* (bboyle2@nd.edu), 255 Hurley Hall, University of Notre Dame, Notre Dame, IN 46556. *The unimodality of pure O -sequences of type three in three variables.* Preliminary report.

In this presentation we will look at some properties of the Hilbert functions of monomial algebras, particularly to see when they are unimodal. Due to Macaulay's theorem, one knows that algebras in two variables are unimodal. Furthermore, it has been shown that monomial Artinian level algebras of type two in three variables have the Weak Lefschetz Property, and thus are unimodal. On the other hand, for any $r \geq 3$, there exists a monomial Artinian level algebra in r variables whose Hilbert function fails unimodality with an arbitrary number of peaks. In this presentation, we will show the unimodality of the Hilbert function in the smallest open case, namely that of monomial Artinian level algebras of type three in three variables. Since the Weak Lefschetz Property does not necessarily hold for such algebras, we give a new approach. (Received September 11, 2010)