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Ozeki, T. Phuong and **W. Vasconcelos**. *The signature of the Chern coefficients of local rings.*

The Hilbert coefficients carry a great deal of information about the ideal. In particular, for parameter ideals Q the first Hilbert coefficient $e_1(Q)$ codes structural information about the ring R itself. Noteworthy properties of R associated to values of $e_1(Q)$ are the Cohen–Macaulay, the generalized Cohen–Macaulay and the Buchsbaum conditions. More recently, similar questions have been examined in general Noetherian local rings. In the joint works with Ghezzi, Goto, Ozeki, Phuong, and Vasconcelos, we extend several of the results on the meaning of the sign of $e_1(I)$. Our main results are centered around the following conjecture given by Vasconcelos at the conference in Yokohama in March 2008:

Conjecture (Vasconcelos) Assume that R is unmixed. Then R is a Cohen–Macaulay local ring if and only if $e_1(Q) = 0$ for some parameter ideal Q of R .

We settle this Conjecture affirmatively. Also we study the problem of when $e_1(Q)$ is independent of the choice of the parameter ideal Q in R . Another important issue is that of the variability of $e_1(Q)$, sometimes for Q in a same integral closure class, and its role in the structure of the ring. (Received February 22, 2010)