1057-13-360 **Lars Winther Christensen\*** (`lars.w.christensen@ttu.edu`), Department of Mathematics and Statistics, M.S. 1042, Lubbock, TX 79409, and **David A Jorgensen**. *Vanishing of Tate homology and depth formulas over local rings.* Preliminary report.

Let $R$ be a commutative noetherian local ring. Let $M$ and $N$ be finitely generated $R$-modules. One says that the *depth formula holds for $M$ and $N$* if $s = \sup\{\, i \mid \operatorname{Tor}_i^R(M, N) \neq 0 \,\}$ is finite and one has

$$\operatorname{depth}_R \operatorname{Tor}_s^R(M, N) - s = \operatorname{depth}_R M + \operatorname{depth}_R N - \operatorname{depth} R.$$

Auslander noted that the depth formula holds if $M$ has finite projective dimension and $s = 0$ or $\operatorname{depth}_R \operatorname{Tor}_s^R(M, N) \leq 1$. In works of Huneke and Wiegand and of Iyengar it has been shown that the formula remains valid if one replaces projective dimension with the weaker notion of complete intersection (CI) dimension. We prove that CI-dimension can be replaced by Gorenstein dimension under the extra assumption that the Tate homology modules $\widehat{\operatorname{Tor}}_*^R(M, N)$ vanish. For modules of finite CI-dimension this extra condition is automatically fulfilled when $s$ is finite.

I will use the discussion of this result to introduce a new way to compute Tate homology; one that allows us to prove that Tate homology is balanced. (Received January 25, 2010)