1133-13-319 **Alexander York*** (a.york@ucf.edu). *Linkage and Perfect Modules.*
There have been many attempts to extend the concept of ideal linkage to modules. Martsinkovsky and Strooker define linkage using a projective presentation of the module under study. One takes a projective presentation of an R-module M

$$P_1 \to P_0 \to M \to 0$$

and takes its dual to get

$$0 \to M^* \to P_0^* \to N \to 0.$$

One then says that M and N are directly linked. One downfall of this method is that it only allows one to study linkage in the confines of grade zero.

Nagel extended this by using different classes of modules to present the ones under study. This allows one to define linkage in higher grades, particularly in the grade of the module under question. Of note is the use of quasi-Gorenstein modules to define linkage. First we take a sequence

$$0 \to L \to C \to M \to 0$$

where C is quasi-Gorenstein and both the dimension and grade of C is the same as that of M, say c. Taking a dual of this sequence yields

$$0 \to \operatorname{Ext}^c_R(M,R) \to \operatorname{Ext}^c_R(C,R) \to N \to 0$$

and we say that M and N are directly linked by C. Using this definition we can extend results proved by Martsinkovsky and Strooker to higher grade by the use of perfect modules. (Received July 31, 2017)