Meeting: 1003, Atlanta, Georgia, SS 13A, AMS Special Session on Algebraic Geometry Codes

1003-14-1218 **Drue Coles*** (dcoles@bloomu.edu), Department of Mathematics, Computer Science, and Statistics, Bloomsburg University, Bloomsburg, PA 17815. *Using vector bundles to investigate limits on the list decodability of AG codes.* Preliminary report.

Vector bundles are geometric objects defined on an algebraic curve or other topological space. Roughly speaking, a vector bundle of rank n on a curve is a continuous family of n-dimensional vector spaces parameterized by the points of the curve. These objects appear in different areas of mathematics and physics, and one is often interested in the set of their "maximal subbundles".

We discuss an idea for investigating limits on the list decodability of AG codes by looking for curves over finite fields that admit rank two bundles with an exceptional number of maximal subbundles defined over the base field. Natural candidates for such curves would be those that admit infinitely many maximal subbundles in the algebraic closure. Several constructions of this kind are known, but it remains to look at these results in the finite field setting.

As a simple example, we construct a rank two bundle on the Klein curve over GF(8) with 21 maximal subbundles over the base field. The general idea is then to pull it back via a suitable covering of the curve to obtain another bundle with at least as many maximal subbundles, and possibly more. There are many interesting technical details to work out in this connection. Some initial steps will be presented. (Received October 04, 2004)