1054-05-137 **Péter P. Varjú*** (pvarju@princeton.edu), Princeton University, Department of Mathematics, Fine Hall,Washington Road, Princeton, NJ 08544-1000. *Expansion in $SL_d(\mathbf{Z}/q\mathbf{Z})$, $q$ square-free.*

I discuss the problem whether certain Cayley graphs form an expander family. A family of graphs is called an expander family, iff the number of edges needed to be deleted from any of the graphs to make it disconnected is at least a constant multiple of the size of the smallest component we get. Let $S$ be a subset of $SL_d(\mathbf{Z})$ closed for taking inverses. For each square-free integer $q$ consider the graph whose vertex-set is $SL_d(\mathbf{Z}/q\mathbf{Z})$ two of which is connected by an edge precisely if we can get one from the other by left multiplication by an element of $S$. Bourgain, Gamburd and Sarnak proves that if $d = 2$ and $S$ generates a Zariski dense subgroup of $SL_2$, then these graphs form an expander family. In the talk I outline a modification of their argument which leads to a simpler proof and allows a generalization to $d = 3$ or to general numberfields. Techniques from arithmetic combinatorics are used, sum-product theorems and Helfgott's product theorems in particular. (Received September 11, 2009)