

Meeting: 1003, Atlanta, Georgia, SS 24A, AMS Special Session on Design Theory and Graph Theory, I

1003-52-93 **Jocelyn Quaintance*** (quaintan@fredonia.edu), 122 North 23rd Street, Mt. Penn, PA 19606.

Letter Representations of Rectangular $m \times n \times p$ Proper Arrays. Preliminary report.

Let $m \neq n$. A rectangular $m \times n \times p$ *proper array* is a three dimensional array composed of directed cubes that obeys certain connectivity and arrow constraints. Because of these constraints, the geometric structure of an $m \times n \times p$ proper array is captured in a preferred $m \times n$ planar face. By associating each connected component present in the preferred face with a distinct letter, an $m \times n$ array of letters is formed. This $m \times n$ array of letters is the *letter representation* associated with the $m \times n \times p$ proper array. Since $m \neq n$, there are the four symmetry transformations that maps both the $m \times n \times p$ proper array to itself and the preferred face onto itself. By applying these four symmetry transformations to the set of letter representations, we are able to form appropriate equivalence classes. The goal is to enumerate all $m \times n$ letter representations modulo symmetry equivalence. This is done by forming four generating functions, each of which derives from a particular symmetry operation. (Received August 03, 2004)