1023-05-815   **Katherine Victoria Field*** (`kvfiel@wm.edu`), CSU #0513, PO Box 8793, Williamsburg, VA 23186, and **Hakan Seyalioglu** and **Charles R Johnson**. *Counting Lower Hessenberg Matrices.* Preliminary report.

We study lower hessenberg matrices with nonnegative integer entries and given non-decreasing row and column sums. Ours is primarily a problem in polyhedral combinatorics, but also includes various aspects of number theory, as well as matrix analysis. This research developed out of a problem originally proposed by Dr. Richard Stanley, which concerned a relationship between catalan numbers and lower hessenberg matrices. While working on this, we discovered that any set of lower hessenberg matrices with nonnegative integer entries and non-decreasing row and column sums exhibits much involved structure. For example, we can partition each of these sets by categorizing every matrix according to the sum of the entries in its upper-left (n-1)x(n-1) submatrix. Then, if we look at the distribution of matrices across the range of sub-sums, we can see that the distribution is symmetric and unimodal. Furthermore, while studying these sub-sums, we discovered several interesting formulas that always give integer results when applied to non-decreasing variables. (Received September 22, 2006)