

1106-VO-2794      **Richard A Brualdi** and **Seth A Meyer\*** ([seth.meyer@snc.edu](mailto:seth.meyer@snc.edu)), St Norbert College, 100 Grant St, De Pere, WI 54115. *A Gale-Berlekamp Permutation-Switching Problem.*

In the spirit of the light switching game of Gale and Berlekamp, we define a light switching game based on permutations. We consider the game over the integers modulo  $k$ , that is, with light bulbs in an  $n \times n$  formation, having  $k$  different intensities cyclically switching from 0 (off) to  $(k - 1)$  (highest intensity) and then back to 0 (off). Under permutation switching, that is, adding a permutation matrix modulo  $k$ , given a particular initial pattern, we investigate both the smallest number  $\mathcal{R}_{n,k}$  of on-lights (the covering radius of the code generated) and the smallest total intensity  $\mathcal{I}_{n,k}$  that can be attained. We obtain an explicit formula for  $\mathcal{I}_{n,k}$  when  $n$  is a multiple of  $k$ . We also determine  $\mathcal{R}_{n,k}$  when  $k$  equals 2 and 3. In general, we obtain some bounds for  $\mathcal{R}_{n,k}$  and  $\mathcal{I}_{n,k}$ . (Received September 16, 2014)