1056-05-134 **Sara D. Townsend*** (cera22dt@yahoo.com), 88A Piney Point Road, Huntsville, TX 77340, and **Suzi Gearheart** and **John Owen**. *The Relative Gain Array of Cayley Graphs.*

The relative gain array (RGA) is a matrix function which has applications to chemical engineering. When one explores iterates of this function, one of four things will occur. If the input matrix A is singular then RGA(A) is zero. If A is nonsingular then in some rare cases, A is fixed by the relative gain array. In other cases, iterates of the function RGA converges to a fixed matrix. And finally, in some cases, iterates of the RGA display chaotic behavior.

A Cayley graph is a graph with a sharply transitive automorphism group. We explore the RGA of various Cayley graphs. Using both Mathematica and Groups Algorithms and Progamming (GAP), we observe the four different behaviors of the RGA. We analyze the defining set S in an attempt to predict the behavior of the relative gain array. We compare the action of the RGA on a Cayley graph with the action of the RGA on the complementary graph. We are especially interested in cases in which either the adjacency algebra (of either the graph or its complement) is closed under the Hadamard product. (Received July 29, 2009)