962-05-1304 **Huaien Li*** (`huaienli@lanl.gov`), T-10 MSK710, Los Alamos National Laboratory, Los Alamos, NM 87545, and **David C. Torney** (`dct@lanl.gov`), T-10 MSK710, Los Alamos National Laboratory, Los Alamos, NM 87545. *The Enumeration of Unlabeled Euler Multigraphs.* Preliminary report.

The enumeration of unlabeled Euler multigraphs, allowing loops, was formulated in terms of cycle indexes by R. C. Read (1959). MAPLE was used for evaluation, yielding the following numbers for graphs with one to ten edges: 1,3,6,16,34,90,213,572,1499 and 4231, resp. When loops are excluded, a different approach is required. For this, we enumerate Euler multigraphs without loops, having given numbers of vertices and edges, via Euler graphs. Labeled Euler graphs are 1:1 with the vertices of a corresponding cut polytope. A representative of every non-isomorphic, unlabeled Euler graph is found from the orbits of these graphs (on a given number of points) induced by the point-action of the symmetric group, corroborating R. W. Robinson's enumerations (1969). (GAP was used for group computations). To each representative, edges may be independently added—by twos—to derive an Euler multigraph. From Polya's theory, the cycle index for the edge-action of the automorphism group of the representative suffices for enumeration of the descendant Euler multigraphs. This yields the enumeration of non-isomorphic, unlabeled Euler multigraphs, with each number of edges and no loops. These numbers are listed for one to seven edges: 0,1,1,4,4,15, and 22, resp. (Received October 03, 2000)