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Jonathan L. Gross (gross@cs.columbia.edu), New York, NY 10027, and **Xiaodong HU**
(xdhu@amss.ac.cn), Beijing, Beijing 100190, Peoples Rep of China. *Enumeration of Digraph
Embeddings.*

A 2-cell embedding of an Eulerian digraph D into a closed surface is said to be *directed* if the boundary of each face is a directed closed walk in D . The *directed genus distribution* of the digraph D is known for very few classes of graphs, compared to the genus distribution of a graph. In this talk, we will introduce a variety of methods for calculating the directed genus distributions of Eulerian digraphs. We use them to derive an explicit formula for the directed genus distribution of any 4-regular outerplanar digraph. We show that the directed genus distribution of such a digraph is determined by the *red-blue star decompositions* of the *characteristic tree* for an outerplanar embedding. The directed genus distribution of a 4-regular outerplanar digraph is proved to be *log-concave*. We introduce *Eulerian splitting* at a vertex of a digraph, and we prove a splitting theorem for digraph embedding distributions that is analogous to the splitting theorem for (undirected) graph embedding distributions. This new splitting theorem allows conversion of the enumeration of embeddings of a digraph with vertex degrees larger than 4 into a problem of enumerating the embeddings of some 4-regular digraphs. (Received September 16, 2013)