1077-05-2688   **Mehvish I. Poshni*** (`poshni@cs.columbia.edu`), **Imran F. Khan** (`imran@cs.columbia.edu`) and **Jonathan L. Gross** (`gross@cs.columbia.edu`). *Genus Distributions of 4-Regular Outerplanar Graphs.*

Unlike many of the graph families for which genus distributions have been calculated previously, the family of 4-regular outerplanar graphs does not have a linearly repetitive structure. I will describe an $O(n^2)$-time algorithm for calculating the genus distribution of any 4-regular outerplanar graph. The algorithm makes heavy use of constructs known as productions, which were first introduced by Gross, Khan and Poshni in 2010. These are schematic representations that capture the effect of performing different types of graph operations on graph embeddings, and they model the change produced in the face-boundary walks incident on predesignated vertices and edges. The productions used in this algorithm are adapted from a previous paper by Gross in 2011. Our algorithm breaks down a given instance of a 4-regular outerplanar graph into an auxiliary graph with multiple components. It then uses a depth-first algorithm to construct an *incidence tree* out of those components. Finally, the original graph is reconstructed from the auxiliary graph components by using information embodied in the incidence tree. This involves using productions at each step of a post-order traversal of the incidence tree to compute the genus distribution of the connected component produced at that step. (Received September 22, 2011)

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