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## Growth in Free Products with Amalgamations of Rooted Graphs

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I will present some basic facts on growth of graphs. Although the concept of growth is most useful for vertex-transitive graphs and comes primarily from groups, I consider finite graphs and special classes of locally finite graphs.

The main classes I consider are the free products of (rooted) graphs with amalgamation (of a common rooted factor), and so-called graph graphs. A *graph graph*  $G = H(G_1, G_2, \dots, G_p)$  is a product of (rooted) graphs  $G_1, G_2, \dots, G_p$ . The product is obtained by taking for each 2-subset  $\{i, j\}$  of  $\{1, 2, \dots, p\}$  either the cartesian product or free product of  $G_i$  and  $G_j$ , depending on whether  $i$  is adjacent or non-adjacent to  $j$  in a given graph  $H$  (called the *blueprint graph*).

The emphasis is on the actual computation of growth generating functions for various operations on graphs, where we try to express the growth series of various composite graphs in terms of growth series of their factors.

This talk is based on joint work in progress with Marston Conder and Thomas W. Tucker.

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