

1125-AE-81

**Eric M Freden\***, freden@suu.edu. *Growth in Groups*.

Given a finitely presented group, let  $\sigma_r$  denote the number of group elements with word metric length  $r \geq 0$ . The growth series for the presentation is defined as the formal power series  $S(z) = \sum \sigma_r z^r$ . Computing  $\sigma_r$  has often involved ad-hoc methods based on counting normal geodesic forms. A more mechanized approach appeared in 1984 when Cannon showed that any Fuchsian group has normal geodesic forms that constitute a regular language and consequently  $S(z)$  is a rational function. By 1992, Cannon, Thurston, et al generalized this result to all word hyperbolic groups as well as some other classes.

This presentation is based on the book chapter of the same name. It considers counting problems in groups where the underlying objects (group elements, geodesic words, words representing the identity, etc) are in correspondence with a context-free (or indexed) language rather than a regular language. In many cases the counting method of Delest-Viennot-Schützenberger is then applicable and can be used to compute growth series. (Received July 13, 2016)