1060-20-145 **Lisa Carbone**, **Leigh Cobbs** and **Scott H. Murray*** (scott.murray@canberra.edu.au), Discipline of Mathematics and Statistics, University of Canberra, Canberra, ACT 2601, Australia.

Computing fundamental domains for congruence subgroups of SL_2.

The Bass-Serre theory of groups acting on trees is vital to the structure theory of certain infinite groups. In this talk, I consider the action of $\mathrm{SL}_2(\mathbb{F}_q((t)))$ and $\mathrm{PGL}_2(\mathbb{F}_q((t)))$ on their Bruhat-Tits graph (or building). By quotienting out the action of congruence subgroups, we get a class of graphs called *fundamental domains*. In addition to their importance in group theory, this construction is believed to give families of *expander* graphs.

Before our work, very few of these graphs had been explicitly constructed. We used the Magma computer algebra system to construct them. This was an ideal problem for an integrated algebra system. We made nontrivial use of code for finite matrix groups, graph isomorphism, and finite geometry. These constructions allowed us to make new conjectures on the structure of these graphs, some of which we have been able to prove.

I will also discuss potential extensions of this work to groups other than SL_2. (Received March 28, 2010)