Seminar on Semigroups, Automata and Languages

Friday, June 6, 2025, 14:30

Online Zoom Link

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DECIDING SUBMONOID MEMBERSHIP FOR HNN EXTENSIONS OF FREE GROUPS

HNN extensions can be used as a way to produce a more complicated group from a simpler one, they do this by "folding" a part of the simpler group onto itself. These can, but do not necessarily, produce wild algorithmic properties. For instance, it is known that the submonoid membership problem for HNN extensions of free groups is undecidable in general. This raises the question of which HNN extensions of free groups do have decidable submonoid membership problem.

In this talk we will focus on a specific sort of HNN extension of a free group, those where the defining isomorphism forms a bijection between different subsets of the same free basis. We will see that such extensions have algorithmically useful properties, which we can use to decide membership in certain submonoids.

Further, we will see that there are certain one-relator groups where these techniques suffice to decide the prefix membership problem and thus, via a result of Ivanov, Margolis and Meakin, are sufficient to decide the word problem for certain one-relator inverse monoids.

This session will be held online in the following Zoom link:

https://fc-up-pt.zoom.us/j/85665346562