

THE EXCLUDED MINORS FOR THE CLASS OF Z_3 -GAINABLE BIASED GRAPHS

Nick Brettell

`nick.brettell@vuw.ac.nz`

Victoria University of Wellington

(This talk is based on joint work with Rutger Campbell, Daryl Funk, and Dillon
Mayhew.)

A *biased graph* is a graph together with a collection of distinguished cycles, called the *balanced* cycles, where no theta subgraph consists of precisely two balanced cycles. A biased graph is Γ -*gainable*, for a group Γ , if it has an orientation and a function mapping each arc to a member of Γ , such that balanced cycles correspond to directed cycles whose product is the identity. There is a natural minor order on biased graphs, and any class of Γ -gainable biased graphs is minor closed, so one can attempt to characterise such a class by its excluded minors. Zaslavsky (1981) proved that there is a single excluded minor for the class of Z_2 -gainable biased graphs. We prove that there are three excluded minors for the class of Z_3 -gainable biased graphs. Our techniques are graph theoretic, but I will discuss the natural question of how this work relates (or does not relate) to known results in matroid theory.