1009-05-13 **David Forge** (`forge@lri.fr`), Laboratoire de recherche en informatique UMR, Bât. 490, Université Paris-Sud, 91405 Orsay Cedex, France, and **Thomas Zaslavsky*** (`zaslav@math.binghamton.edu`), Department of Mathematical Sciences, State University of New York at Binghamton, Binghamton, NY 13902-6000. *Integral graph coloring and affinographic hyperplane arrangements.*

An affinographic hyperplane arrangement is a finite set of hyperplanes in $\mathbb{R}^n$ whose equations have the form $x_j - x_i = c$. The Shi and Linial arrangements are examples. The problem of determining the characteristic polynomial $p(\lambda)$ of such an arrangement can be solved (as, in effect, Athanasiadis did) by taking a large positive integer m and counting the number $\chi(m)$ of lattice points $x \in \mathbb{Z}^n_{>0}$ with all $x_i \leq m$ for large positive integers m. (Athanasiadis' method was a slightly complicated variant of this.) When m is large, $\chi(m) = p(m)$, a polynomial. However, for all $m > 0$, $\chi(m)$ is a piecewise polynomial and a Tutte invariant. We show the exact form of $\chi(m)$, from which it is apparent why it is a polynomial when m is large. Our method is to reinterpret the problem as one of coloring rooted integral gain graphs. (Received June 07, 2005)