**Meeting:** 1002, Pittsburgh, Pennsylvania, SS 8A, Special Session on Graph Polynomials

1002-05-23 **David G. Wagner*** (dgwagner@math.uwaterloo.ca), Department of C&O, University of Waterloo, Waterloo, Ontario N2L 3G1, Canada. *A strange tree–enumeration formula from electrical network theory.*

For a graph $G = (V, E)$, let $y := \{y_e :\ e \in E\}$ be indeterminates and let $G(y) := \sum_T y^T$ with the sum over all spanning trees of $G$, where $y^T := \prod_{e \in T} y_e$. For $e, f \in E$, let $G_e^f$ denote $G$ with $e$ contracted and $f$ deleted, *et cetera*. In her thesis, Y.-B. Choe gave two proofs that there is a polynomial $C(G, e, f; y)$ such that

$$G_e^f(y) G_f^e(y) - G_{ef}(y) G^{ef}(y) = C(G, e, f; y)^2.$$

In fact $C(G, e, f; y)$ is a signed enumerator for certain two–component forests in $G$. This formula is a standard result in electrical network theory, being a sharp statement of the Rayleigh monotonicity property. One of Choe's proofs (based on that of Feder and Mihail) generalizes to sixth–root of unity matroids. The challenge I pose to the audience is to find a combinatorial (bijective) proof of this formula. (Received July 06, 2004)