1165-05-6 **Andrew Tawfeek*** (atawfeek21@amherst.edu), 0401 Keefe Campus Center, Amherst College, Amherst, MA 01002, and **Ivan Contreras** and **Alejandro Morales**. *Enumeration of Discrete Gradient Vector Fields on Simplicial Complexes.* Preliminary report.

Discrete Morse theory, a simplicial complex-analog to smooth Morse theory, has been developed over the past few decades since its original formulation by Forman in 1998. We provide a novel approach to enumerating the discrete gradient vector fields on finite simple graphs and show that their generating function is given by the characteristic polynomial of the graph Laplacian. We then discuss our current research on generalizing our results to higher-dimensional simplicial complexes and how notions of higher dimensional rooted forests come into play, as well as what can be said about generating functions and their relation to the complex's Laplacian. (Received December 10, 2020)