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Luke P. Diaz* (diaz@nmsu.edu). *Applications of Discrete Morse Theory to Certain Complexes of Bounded Degree Graphs*. Preliminary report.

Following work of J. Jonsson, X. Dong, and others, we apply discrete Morse theory techniques to certain complexes of graphs with bounds on the vertex degrees. We extend the method of element matching to develop techniques to treat iterated element matchings. In particular, we give an inductive description of the critical simplices as they evolve through the stages of an iterated element matching. For some families, the general inductive description of critical simplices can be reduced to an explicit closed form. In these cases, we conclude the graph complexes have the homotopy type of a wedge of equidimensional spheres. Standard techniques of algebraic topology apply to deduce information about homotopy type and homology of related graph complexes. Also, we obtain information about representation, in homology, of the appropriate symmetric group. We have implemented the general procedures in SAGE and will present performance data and results in experiments. (Received September 16, 2011)