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Boya Wen* (u3502798@connect.hku.hk). *k-Forms on Products of Weighted Graphs and Fractals*. Preliminary report.

The theory of k -forms on differentiable manifolds is rich and profound. Recent research also defined and studied differential equations on fractals. It is then natural to ask if it is possible to develop a theory of k -forms on Cartesian products of fractals. Our approach is to first study the graph approximations of fractals. We defined analogous notions of k -cells, k -chains, k -vectors, k -covectors, k -vector fields, k -covector fields, integration of a k -covector field along a k -chain, exterior differentiation of a k -covector field etc on products of weighted graphs, and found that the theory is in parallel with the classical theory on manifolds. Then we attempt to pass to the fractal limit via a self-similar transform of weights, which is not yet complete and could be studied in future research. (Received January 23, 2016)