

Contents

1	Introduction	1
2	Basic frameworks and key constants	13
2.1	Framework	13
2.2	Conductance constant	21
2.3	Combinatorial modulus	24
2.4	Neighbor disparity constant	28
3	Conductive homogeneity and its consequences	35
3.1	Construction of p -energy: $p > \dim_{AR}(K, d)$	35
3.2	Construction of p -energy: $p \leq \dim_{AR}(K, d)$	49
3.3	Conductive homogeneity	51
4	Conductive homogeneity of self-similar sets	57
4.1	Self-similar sets and self-similarity of energy	57
4.2	Conductive homogeneity of self-similar sets	62
4.3	Subsystems of (hyper)cubic tiling	64
4.4	Examples: subsystems of (hyper)cubic tiling	76
4.5	Rationally ramified Sierpiński crosses	81
4.6	Nested fractals	88
5	Knight move implies conductive homogeneity	95
5.1	Conductance and Poincaré constants	95
5.2	Relations of constants	99
5.3	Proof of Theorem 3.33	104
6	Miscellanea	107
6.1	Uniformity of constants	107
6.2	Modification of the structure of a graph	111
6.3	Open problems	112
	Appendices	115
A	Basic inequalities	115
B	Basic facts on p -energy	115
C	Useful facts on combinatorial modulus	117
D	An Arzelà–Ascoli theorem for discontinuous functions	119

viii Contents

E	Geometric properties of strongly symmetric self-similar sets	120
F	List of definitions and notations	125
References		127