Chapter2: Alternative method for shape descriptions

2.1 Kac’s idea

2.2 Heat content

2.3 Numerical methods for solving parabolic PDEs

2.4 Monte Carlo methods for simulating heat content

2.4.1 monte Carlo approximation of integrals

2.4.1.1 Sample size determination: DKW; Cheb

2.4.2 Simulation of particle’s trajectories

2.4.2.1 LRWS

2.4.3 Output Analysis

2.4.3.1 KM estimator & Confidence interval

2.4.3.2 two-sample statistical tests

Chapter3: Method Validation in Annulus

3.1 Analytical Results

3.2 Numerical Approximation

3.3 LRWs

3.4 Comparison of LRWs and analytical results

Chapter4: LRWs in Artificial Images — Yujie

Chapter5: ERWs in Real Root Images

5.1 Description of ERWs\*

5.2 Images Description

5.3 Output Analysis

5.3.1 Distance Matrices

5.3.2 Statistical Tests for Distance matrices

Chapter6: Conclusion