Inn'formal Probability Seminar

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"Heat kernel and Green's function on discrete spaces"

Abstract

The heat equation on Euclidean spaces was originally studied in the early 1800's by Fourier. Fourier transforms provide a very elegant solution to the heat equation, but is not robust under even slight changes to the underlying space. Today, when looking for estimates for the solution, mathematicians work instead with the fundamental solution to the heat equation, called the heat kernel, or with the associated Green function.

Why should we care about this as probabilists? The probability density of random walks on ``lattice like graphs'' are heat kernel-like. Thus, good estimates of the heat kernel have applications for computing mixing times, hitting times, gambler ruin with more than two players, etc. We will first discuss how to translate some problems to the language of heat kernels and some techniques for controlling the heat equation that work both in continuous and discrete spaces. If time allows, I will discuss some applications to expected hitting times on finite graphs that is work in progress.

Joint work with Laurent Saloff-Coste

Monday | 5.12.2022 | 16:15

SR 609 | civil engineer building