An introduction to the theory of (non-local) Dirichlet forms

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Abstract

A Dirichlet form $(\mathcal{E}, \mathcal{D}(\mathcal{E}))$ is an analytic object that can be used to construct and study certain Markov processes. Dirichlet forms use a quasi-sure analysis, meaning that we are permitted to ignore certain exceptional sets which are not visited by the process, which can sometimes have certain advantages. In this mini-course we will introduce basic concepts of the theory of (symmetric) Dirichlet forms and explore their connection to Markov processes. We will cover several important examples of Dirichlet spaces, focusing on jump-type (non-local) symmetric Dirichlet forms. The course is intended for graduate students in the early stages of their PhD programme.

Bibliography:

(1) N. Bouleau and F. Hirsch. *Dirichlet forms and analysis on Wiener space.* Walter de Gruyter, 1991.

(2) M. Fukushima, Y. Oshima, and M. Takeda. *Dirichlet forms and symmetric Markov processes.* de Gruyter, 2nd edition, Berlin, 2010.

(3) Z.-M. Ma and M. Röckner. *Introduction to the theory of (non-symmetric) Dirichlet forms.* Springer-Verlag Berlin Heidelberg, 1992.