Lecture Notes in Mathematics 1923

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Parameter Estimation in Stochastic Differential Equations

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To the memory of my late grand father

and to my parents and brothers for their love and affection

Preface

I am indebted to my advisor Arup Bose from who I learned inference for diffusion processes during my graduate studies. I have benefited a lot from my discussions with Yacine Ait-Sahalia, Michael Sørensen, Yuri Kutoyants and Dan Crisan. I am grateful to all of them for their advice.

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Contents

Basic Notations

$(\Omega, \mathcal{F}, P)$	probability space
$\mathbb{R}$	real line
$\mathbb{C}$	complex plane
I_A	indicator function of a set A
$\stackrel{\mathcal{D}[P]}{\longrightarrow}$	convergence in distribution under the measure P
$\stackrel{P}{\rightarrow}$	convergence in probability P
a.s. [P]	almost surely under the measure P
P-a.s.	almost surely under the measure P
$a_n = o(b_n)$	$\frac{a_n}{b_n} \to 0$
$a_n = O(b_n)$	$\frac{a_n}{b_n}$ is bounded
$X_n = o_P(b_n)$	$\frac{X_n}{b_n} \stackrel{P}{\rightarrow} 0$
$X_n = O_P(b_n)$	$\frac{X_n}{b_n}$ is stochastically bounded, i.e., $\lim_{A\to\infty} \sup_n P\{\lvert\frac{X_n}{b_n}\rvert > A\} = 0$
$\square$	end of a proof
$A := B$	A is defined by B
$A =: B$	B is defined by A
$\equiv$	identically equal
$\ll$	absolute continuity of two measures
i.i.d.	independent and identically distributed
$\mathcal{N}(a, b)$	normal distribution with mean a and variance b
$\Phi(.)$	standard normal distribution function
$X \sim F$	X has the distribution F
w.r.t.	with respect to
r.h.s.	right hand side
l.h.s.	left hand side
$a \bigvee b$	maximum of a and b
$a \bigwedge b$	minimum of a and b