系统科学与数学 2006 26 (26(2)): 245-256 ISSN: 0583-1431 CN: 11-1914/R

非退化扩散过程的水平集和极集

陈振龙
浙江工商大学统计与计算科学学院,杭州 310035

收稿日期 修回日期 网络版发布日期 接受日期

摘要 设$X(t)(t\in R_+)$是一个d维非退化扩散过程.

本文得到了比原有结果更一般的非退化扩

散过程极性的充分条件, 证明了对任意$u\in R^d$,

紧集$E\subset (0, +\infty),$ 有

$$

P\left\{{\rm dim}(X^{-1}(\{u\})\cap E)=\max

\Big\{0,{\rm dim}E-\frac{d}{2}\Big\}\right\}>0,

$$

若$d=1,$则对任意紧集$F\subset R, $

$$

{\rm inf}\{{\rm dim}E:E\in {\cal B}(R_+),P(X(E)\cap F

\not= \phi)>0\}=\frac{1}{2}-\frac{{\rm Dim}F}{2};

$$

若$d\geq 2,$ 则对任意紧集$E\subset (0,+\infty),$

$$

{\rm inf}\{{\rm dim}F:F\in {\cal B}

(R^d),P(X(E)\cap F\not= \phi)>0\}=d-2{\rm Dim}E,

$$

其中$

{\cal B}(R^d)$为$R^d$上的Borel σ-代数, dim和Dim分别表示

Hausdorff维数和Packing维数.

关键词 扩散过程, 极集, 水平集, Hausdorff维数, Packing维数
分类号

The Level Sets And The Polar Sets For Nondegenerate Diffusion Processes

Chen Zhenlong

College of Statistics and Computing Science, Zhejiang Gongshang University, Hangzhou 310035

Abstract Let $X(t) (t\in R_+)$ be the d-dimensional nondegenerate diffusion processe. More generalized sufficient conditions than the former ones for a compact set $F\subset R^d$ to be a Polar set are proved. It is also proved that for any $u\in R^d$, any compact $E\in R_+$, $$ P\{{\rm dim}(X^{-1}(\{u\})\cap E)=\max\Big\{0,{\rm dim}E-\frac{d}{2} \Big\}>0, $$ and if $d\geq 2$, then for any compact set $E\subset R_+,$ $$ \inf\{{\rm dim}F:F\in {\cal B}(R^d),P(X(E) \cap F\not= \phi)>0\}=d-2{\rm Dim}E, $$ and if $d=1$, then for any compact set $F\subset R,$ $$ \inf\{{\rm dim}E:E\in {\cal B} (R),P(X(E)\cap F\not= \phi)>0\}=\frac{1}{2}-\frac{{\rm Dim}F}{2}, $$ where ${\cal B}(R^d)$ denotes the Borel $\sigma $-algebra in $R^d $, and dim and Dim are Hausdorff dimension and Packing dimension respectively.

Key words Diffusion process polar set level set Hausdorff dimension Packing dimension

DOI:

通讯作者