

Accepted Manuscript

On the planar Brownian Green's function for stopping times

Greg Markowsky

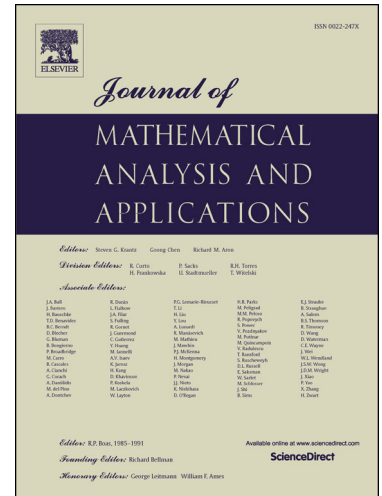
PII: S0022-247X(17)30563-2
DOI: <http://dx.doi.org/10.1016/j.jmaa.2017.06.013>
Reference: YJMAA 21455

To appear in: *Journal of Mathematical Analysis and Applications*

Received date: 19 December 2016

Please cite this article in press as: G. Markowsky, On the planar Brownian Green's function for stopping times, *J. Math. Anal. Appl.* (2017), <http://dx.doi.org/10.1016/j.jmaa.2017.06.013>

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.



On the planar Brownian Green's function for stopping times.

Greg Markowsky
 Monash University
 Victoria 3800, Australia
 gmarkowsky@gmail.com

June 13, 2017

Abstract

It has been known for some time that the Green's function of a planar domain can be defined in terms of the exit time of Brownian motion, and this definition has been extended to stopping times more general than exit times. In this paper, we extend the notion of conformal invariance of Green's function to analytic functions which are not injective, and use this extension to calculate the Green's function for a stopping time defined by the winding of Brownian motion. These considerations lead to a new proof of the Riemann mapping theorem. We also show how this invariance can be used to deduce several identities, including the standard infinite product representations of several trigonometric functions.

2010 Mathematics subject classification: 60J65, 30C35, 60J45, 40A20.

Keywords: Planar Brownian motion; Green's function; analytic function theory; Riemann mapping theorem; infinite products.

1 Introduction

In the field of analysis, Green's function $G(x, y)$ on regions of \mathbb{R}^n is formally defined to be the solution of $LG(x, y) = \delta(y - x)$, where L is a linear differential operator. In complex analysis, where the Laplacian is the differential operator of most importance, for a given domain $\Omega \subseteq \mathbb{C}$ and $z \in \Omega$ the Green's function of the Laplacian is generally defined by the following.

Definition 1. *The Green's function $G_\Omega(z, w)$ on a domain Ω is a function in w on $\Omega \setminus \{z\}$ satisfying the following properties.*

Download English Version:

<https://daneshyari.com/en/article/5774594>

Download Persian Version:

<https://daneshyari.com/article/5774594>

[Daneshyari.com](https://daneshyari.com)