

Accepted Manuscript

Spectral analysis for a family of treelike networks

Meifeng Dai, Xiaoqian Wang, Yufei Chen, Yue Zong, Yu Sun, Weiyi Su

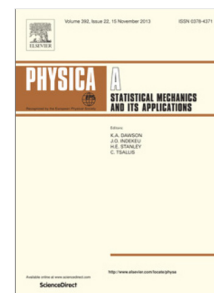
PII: S0378-4371(18)30174-2
DOI: <https://doi.org/10.1016/j.physa.2018.02.088>
Reference: PHYSA 19208

To appear in: *Physica A*

Received date: 30 December 2017

Please cite this article as: M. Dai, X. Wang, Y. Chen, Y. Zong, Y. Sun, W. Su, Spectral analysis for a family of treelike networks, *Physica A* (2018), <https://doi.org/10.1016/j.physa.2018.02.088>

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.



Spectral analysis for a family of treelike networks

Meifeng Dai^{a*} Xiaoqian Wang^a Yufei Chen^a Yue Zong^a Yu Sun^a Weiyi Su^b

^a *Institute of Applied System Analysis,*

Jiangsu University, Zhenjiang, 212013, P. R. China

^b *Department of Mathematics, Nanjiang University, Nanjing, 210093, P. R. China*

E-mail: daimf@mail.ujs.edu.cn

Abstract

For a network, knowledge of its Laplacian eigenvalues is central to understand its structure and dynamics. In this paper, we study the Laplacian spectra and their applications for a family of treelike networks. Firstly, in order to obtain the Laplacian spectra, we calculate the constant term and monomial coefficient of characteristic polynomial of the Laplacian matrix for a family of treelike networks. By using the Vieta theorem, we then obtain the sum of reciprocals of all nonzero eigenvalues of Laplacian matrix. Finally, we determine some interesting quantities that are related to the sum of reciprocals of all nonzero eigenvalues of Laplacian matrix, such as Kirchhoff index, global mean-first passage time (GMFPT).

Keywords Laplacian spectra, treelike network, Kirchhoff index, global mean-first passage time.

1 Introduction

Over the years, the study of networks associated with complex systems has received a great deal of attention of researchers from different scientific fields [1, 2, 3, 4, 5, 6, 7, 8, 9]. The key to the study of complex systems is understanding the topological structure. The Laplacian eigenvalues of a network provide important insight into structural features and dynamical properties on the network [10, 11, 12, 13, 14, 15, 16]. For example, the second smallest eigenvalue of the Laplacian matrix of a network is related to its diameter; the product of all nonzero Laplacian eigenvalues

*Corresponding author. Tel.: +86 13815158555. E-mail address: daimf@mail.ujs.edu.cn , daimf0225@163.com (M. Dai).

Download English Version:

<https://daneshyari.com/en/article/7375430>

Download Persian Version:

<https://daneshyari.com/article/7375430>

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