TSUKUBA J. MATH.
Vol. 14 No. 1 (1990), 155—166

# DIAGONAL TRANSFORMATIONS OF TRIANGULATION ON SURFACES

Dedicated to Professor Yukihiro Kodama on his 60th birthday

By

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## 1. Introduction

There is introduced in [3] an interesting theorem on maximal planar graphs, due to Wagner [6], as follows:

THEOREM 1. (K. Wagner) *Any two maximal planar graphs with the same number of vertices are equivalent under diagnal transformations.*

A *maximal planar graph* $G$ is a simple graph embedded in the plane such that one can add no new edge to it in the plane, that is, such a one that each region or face is three-edged. The *diagonal transformation* is to switch the diagonal edge $ac$ in the union of two adjacent triangular faces $abc$ and $acd$, as shown in Figure 1. We however have to preserve the simpleness of graphs, that is, the diagonal transformation cannot be applied if vertices $b$ and $d$ are adjacent in $G$.

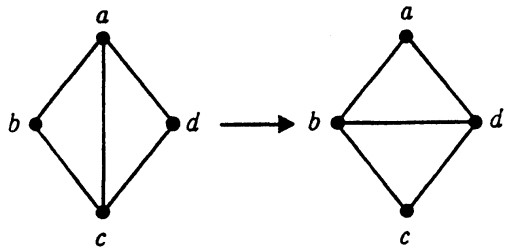


Figure 1. Diagonal transformation

In fact, it has been that every maximal planar graph can be transformed into the normal form given in Figure 2 by a finite sequence of diagonal transformations and hence any two maximal planar graphs are transferable via this normal form. The planarity of graphs ensures that the degree of an arbitrary vertex can be decreased to 3 by switching edges incident to it.

Received June 12, 1987. Revised June 19, 1989.