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by

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TWO GRAPHICAL MODELS OF THE KAUFFMAN POLYNOMIAL AND THEIR RELATIONSHIP

XIAN'AN JIN AND QI YAN

Abstract. We introduce two oriented 4-valent graphical models for the Kauffman polynomial: one (called HJ) is obtained by combining Jaeger's formula and Kauffman-Vogel model for the Homflypt polynomial; the other (called WF) is obtained by combining Kauffman-Vogel model for the Kauffman polynomial and Wu's formula. The main goal of this paper is to explore the relationship between the two models. We find that there is a one-to-many correspondence between the terms of HJ model and the terms of WF model.

1. Introduction

In [14, 17], Kauffman and Vogel generalized the Homflypt and Kauffman polynomials from links to 4-valent rigid vertex spatial graphs. Conversely, an unoriented (resp. oriented) 4-valent plane graph expansion for the Kauffman (resp. Homflypt) polynomial of unoriented (resp. oriented) links was obtained, which is implicit in [17]. In 1989, Jaeger announced a relation [16], we shall call it Jaeger's formula, between the Kauffman polynomial of an unoriented link diagram and the Homflypt polynomials of some oriented link diagrams constructed from the unoriented link diagram. Recently, Wu generalized Jaeger's formula from link diagrams to 4-valent rigid vertex spatial graph diagrams [22]. We shall call it Wu's formula. Note that 4-valent rigid vertex spatial graph diagrams include 4-valent plane graphs as a special case. In this paper we shall confine ourselves in 4-valent plane graphs.

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Key words and phrases. Kauffman polynomial, 4-valent graph, Jaeger's formula, Homflypt polynomial, Relationship.

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