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An algorithm that changes the companion graphs

M. Azram

Introduction

Knot theory is a rich subject because of its many readily available examples. It has undergone dramatic changes during the last 12 years. A connection between knot theory and graph theory has been established by Reidemeister [R]. Graphs of knots (links) have been repeatedly employed in knot theory [Au], [C] and [KT]. In the recent past L. H. Kauffman [K] has established that "Universes of knots (links) are in one-to-one correspondence with planar graphs". In the proof, he has beautifully given the method of constructing corresponding universe from a given graph. With the introduction of *LR*-Graphs, one can easily extend the one-to-one correspondence to knots (linked links). The pivotal moves in the theory of knots are the Reidemeister moves. I will view these moves as Reidemeister moves of type I, type II and type III as shown in Figure 1.

Graph theoretic versions of Reidemeister moves has been discussed in detail by Azram [Az2]. Yajima–Kinoshita [YK] have shown that the companion graphs corresponding to a projection are equivalent. I myself have shown via Reidemeister moves that the graph corresponding to black (white) regions of a prime knot as well as that of composite knot is equivalent to its companion [Az1].

Having equivalence of companion graphs, construction (ahead) of the companion graph of a given connected planar *LR*-Graph and graphic versions of Reidemeister moves, it is natural to consider how one can change a given graph to its companion and vice versa by applying the graphic moves corresponding to the basic Reidemeister moves and without reference of the knot (link).

This article is devoted to write an algorithm that changes the graph corresponding to the black (white) regions of an altenating knot (linked link) with all labels 'L' (or 'R') to its companion graph. Consequently, by constructing the corresponding