Summary of Research Results
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When I started a graduate school in Japan, Knot Theory was a shining star and finding a knot invariant seemed to be important. I wrote my observation on Ribbon Knots as a Master thesis. It was a great fascination for me to find a relationship between visible geometry and invisible algebra; and the Reidemeister moves coined a strong impression in my mind like a core of mathematics. To conclude Japanese graduate school, I published the paper in List [13] with my advisor.

During my teaching at a secondary school, Knot Theory has been rapidly developed and I felt it difficult to catch up. I found topological graph theory to be a reasonable area for me to pursue. I proved a generating theorem for 4-regular simple planar graphs and prepared to publish the result. Someone informed me that the contents I proved had already been published together with another paper that corrects some errors in the first paper. My result caught the tricky part and covered both of the two papers. I was disappointed but also encouraged to continue doing research. Since 4-regular simple planar graphs had been solved, I began to investigate a possible generating theorem for 5-regular simple planar graphs; I struggled with proving an algorithm since my method contained the process to increase the number of vertices.

When I told my story to Guoli Ding at LSU, he suggested that I prove a stronger theorem than a generating theorem; it is called a ***splitter theorem.*** So I did it in my dissertation and published them separately [List 7, 11] except [List 1].

Next, I focused on directed graphs and their book embeddings under a certain rule [List 5]. Meanwhile, I helped engineers and computer scientists with my knowledge of graph theory and topology [List 4, 6,8].

After coming back to Japan, my mathematical desire went back to topology or Knot Theory. The process of defining a Kauffman polynomial was new to me, and I found a similarity to a Tutte polynomial in Graph Theory. The Knot seminar of Tsuda introduced me to the Kauffman’s 3-variable polynomials defined for knot diagrams.