ABSTRACT

PLATONIC RIEMANN SURFACES AND PETRIE POLYGONS

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The main topic of this study, which consists of four chapters, is to investigate Petrie polygons and their symmetry groups corresponding to regular maps on Platonic Riemann surfaces.

In the first chapter, the topic and the results of the thesis have been introduced.

In the second chapter, basic concepts that are necessary for the main topic of the thesis have been included.

In the third chapter, Petrie polygons and the corresponding Petrie automorphisms have been introduced. These are automorphisms that fix the Petrie polygons setwise but have no fixed points. Moreover, the conjugacy classes of Petrie automorphisms have been determined. It has been shown that the symmetry group of a Petrie polygon is dihedral. Then, a formula for the number of all Petrie polygons of a regular map has been proved, and upper and lower bounds have been found for this number. The orders of Petrie automorphisms of all reflexible regular maps of genus one have been determined. The orders of Petrie automorphisms and the numbers of all Petrie polygons of some well-known families of regular maps such as Hurwitz maps have been determined. It has also been shown that the regular maps with identity Petrie automorphisms can only exist on Wimann and Accola-Maclachlan surfaces. Finally, the orders of Petrie automorphisms, the numbers of all Petrie polygons and the lengths of Petrie polygons of all reflexible regular maps of genus up to 15 have been calculated.

In the fourth chapter, the results of the thesis summarized briefly.

Key Words: Riemann surfaces, Regular maps, Platonic surfaces, Petrie polygons