

K3 and Enriques surfaces

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In this introductory lecture, I would like to talk on periods of K3, Enriques surfaces, and their automorphisms. Thanks to the Torelli type theorem for K3 surfaces due to Piatetsuki-Shapiro, Shafarevich [4], we can reduce many geometric problems to those in lattice theory. First I shall recall a lattice theory including classification of even unimodular lattices, discriminant quadratic forms, overlattices, and primitive embeddings of even lattices into even unimodular lattices. Then we define the period domains of K3 and Enriques surfaces. We remark that in case of polarized K3 surfaces or Enriques surfaces, the period domain is a bounded symmetric domain of type IV (If I have a time, I will give a brief introduction on Borcherds theory on automorphic forms on this domain).

Next, as an application, we shall discuss the description of the group of automorphisms of K3 and Enriques surfaces. Also we mention finite groups acting on K3 surfaces.

References

- [1] W. Barth, K. Hulek, C. Peters, A. Van de Ven, Compact complex surfaces, 2nd ed., Springer-Verlag, Berlin, Heidelberg, New York 2003.
- [2] J. H. Conway, N. J. A. Sloane, Sphere packings, lattices and groups, Grundlehren Math. Wiss. Bd 290, 3rd ed., Springer-Verlag, Berlin, Heidelberg, New York 1999.
- [3] V. V. Nikulin, Integral symmetric bilinear forms and its applications, Math. USSR Izv., **14** (1980), 103–167.
- [4] I. Piatetsuki-Shapiro, I. R. Shafarevich, A Torelli theorem for algebraic surfaces of type K3, Math. USSR Izv., **5** (1971), 547–587.