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HILBERT MODULAR SURFACES ¹

by Friedrich E. P. HIRZEBRUCH

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§ 0. INTRODUCTION AND PREPARATORY MATERIAL

0.1. In my Tokyo IMU-lectures I began with a survey of the Hilbert modular group G of a totally real field of degree n over the rationals, or more generally of discontinuous groups Γ operating on \mathfrak{H}^n where \mathfrak{H} is the upper half plane. Then I concentrated on the case $n = 2$ and studied the non-singular algebraic surfaces (Hilbert modular surfaces) which arise by passing from \mathfrak{H}^2/G to the compactification $\overline{\mathfrak{H}^2/G}$ and by resolving all singular points of the normal complex space $\overline{\mathfrak{H}^2/G}$. I gave the proof for the resolution of the cusp singularities, a result announced in my Bourbaki lecture [39]. Then I talked about the calculation of numerical invariants (arithmetic genus, signature) of the Hilbert modular surfaces and on the problem of deciding which of these surfaces are rational. This problem is studied in the present paper with much more detail than in the lectures. We construct certain curves on the Hilbert modular surfaces (arising from imbeddings of \mathfrak{H} in \mathfrak{H}^2). Properties of the configuration of such curves

¹) International Mathematical Union lectures, Tokyo, February-March 1972.