

AREA QUANTIZATION OF THE PARAMETER SPACE OF RIEMANN SURFACES IN GENUS TWO

A. V. Nazarenko

Bogolyubov Institute for Theoretical Physics,
Nat. Acad. of Sci. of Ukraine
(14-b, Metrologichna Str., Kyiv 03680, Ukraine;
e-mail: nazarenko@bitp.kiev.ua)

S u m m a r y

We consider a model of compact Riemann surfaces in genus two represented geometrically by two-parametric hyperbolic octagons with an order $\pi/2$ automorphism. We compute the generators of the Fuchsian group and give a real-analytic description of the corresponding Teichmüller space parametrized by the Fenchel–Nielsen variables in terms of geometric data. We state the structure of the parameter space by computing the Weil–Petersson (WP) symplectic two-form and analyzing the isoperimetric orbits. Combining these results, the WP area in the parameter space and the canonical action–angle variables for the orbits are found. Using the ideas from the loop quantum gravity, we apply our formalism to the description of the classical geometrodynamics of Riemann surfaces and the WP area quantization. The results of the paper may be interesting due to their applications to the quantum geometry, chaotic systems, and low-dimensional gravity.