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Integrable billiards with slipping

The report will be devoted to a new step in the theory of integrable billiards. In classical billiards, the trajectory points on the boundary before reflection and after coincide. The removal of this restriction allowed us to consider the generalization of billiards — billiards with slipping, which were introduced by A.T. Fomenko. An isometry is introduced at the boundary of such a billiard table. The particle, hitting the boundary, continues to move along the specified isometry. The report will consider isometries that match a point on the boundary to another point obtained by rotating the radius-vector by some angle. Geodesic flows on non-orientable surfaces with additional integrals of degree 1 or 2 in momentum were modeled using billiard isometry, which identifies diametrically opposite points of the confocal quadric. A new class of integrable billiards will also be considered — billiards with alternating slipping. In such a system, the boundary point from which the particle continues to move functionally depends on the additional first integral. For this billiard system in the disk, it is shown that the isoenergetic surfaces realize the set of manifolds of the Heegaard genus 1 and 0.