Andrey Popov (Moscow State University, Moscow, Russia)
Discrete nets on the Lobachevsky plane and their applications

Abstract: Methods of non-Euclidean hyperbolic geometry are applied to the problem of construction of the numerical integration algorithms for some types of nonlinear equations in modern mathematical physics. The methodology of the approach is based on the theory of Λ^2-representations of differential equations [1,2] which associates them with metrics of constant negative curvature. Based on an analysis of a discrete rhombic Tchebychev net on the Lobachevsky plane, a well-constructed geometric algorithm for solving of the Darboux problem for the sine-Gordon equation is presented. Some problems arising in the context of the present investigation are discussed [3,4].

1. E.G.Poznyak, A.G.Popov Lobachevsky geometry and the equations of mathematical physics.// Russian Acad. Sci. Dokl. Math., 1994, V.48, N 2, P.338-342.

2. A.G.Popov The Non-Euclidean geometry and differential equations. // Banach Center Publications. Symposium on Singulaties and Differential Equations., 1995, V.33, P.84-98.

3. R.Sauer Parallelogrammgitter als Modelle pseudospharischer Flachen. // Math. Zeitschrift., 1950, V.52, P.611-622.

4. A.G.Popov Applications of discrete meshes on hyperbolic plane in integration of equations of the Lobachevsky class. // Computational mathematics and mathematical physics., 1999, V.39, N 6, P.897-906.