

On Classification of Conic Sections in the Pseudo-Euclidean Plane

(Talk)

Marija Šimić Horvath

Faculty of Architecture, University of Zagreb, Croatia

`marija.simic@arhitekt.hr`

(joint work with Jelena Beban-Brkić, Faculty of Geodesy, University of
Zagreb, Croatia)

A pseudo-Euclidean plane $PE_2(\mathbb{R})$ is a real affine plane where a metric is induced by an absolute figure $(\omega, \Omega_1, \Omega_2)$ consisting of the line ω at infinity and two different real points $\Omega_1, \Omega_2 \in \omega$.

The aim of our work is a complete classification of the second order curves in $PE_2(\mathbb{R})$. The classification has been made earlier in the paper of N. V. Reveruk (Krivie vtorogo porjadka v psevdovklidovoi geometrii, *Uchenye zapiski MPI* **253** (1969) 160–177.), but it showed to be incomplete and not possible to cite and use in further studies of properties of conics, pencil of conics, and of quadratic forms in pseudo-Euclidean spaces.

Our approach is based on linear algebra. Notions such as a pseudo-orthogonal matrix, pseudo-Euclidean values of matrix, diagonalization of a matrix in a pseudo-Euclidean way are introduced. In addition, conics are divided in families and by types, giving both of them geometrical meaning. All this allows to determine the invariants of a conic with respect to the group of motions in $PE_2(\mathbb{R})$ making it possible to determine a conic without reducing its equation to canonical form.

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