

GEOMETRY AND TOPOLOGY OF CAUSTICS — CAUSTICS '98

Editors of the Volume

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ABOUT THE SYMPOSIUM

This volume contains papers which have been written on the occasion of the Banach Center Symposium on Geometry and Topology of Caustics — *CAUSTICS '98*. Caustic curves were introduced into mathematics by Ehrenfried Walter von Tschirnhaus (1651–1708) in 1682 and by Christiaan Huygens (1629–1695) in his *Traité de la Lumière* (1690). In the interim a huge amount of work has been done on this subject both by physicists and mathematicians. Of particular note has been the success of the new concepts in singularity theory and symplectic geometry, which successfully penetrate several branches of mathematics and mathematical physics.

The aim of the Symposium was to bring together specialists from these areas of knowledge and stimulate an active exchange of ideas and working methods.

The Symposium was held at the Stefan Banach International Mathematical Center in Warsaw during the first two weeks of June 1998. There were 49 visitors participating in the Symposium and over 40 seminars.

The Symposium was financially supported by the State Committee for Scientific Research (KBN) and could not have been such a success without the hard work of the staff of the Banach Center to whom we are very grateful.

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FOREWORD

Caustics of ray systems are the main geometrical objects arising in investigations of moving wave fronts.

A deep interconnection of this classical domain of geometrical optics with symplectic and contact geometries and topologies was found recently.

This invention expanded enormously the range of the applications of the singularity theory of caustics. It describes now not only the systems of rays in geometrical optics, but also the singularities of flattenings and inflections in projective differential geometry of curves and surfaces, the singularities arising in control theory (as well as in the other manifestations of Huygens principle). Singularities of caustics appear in the study of asymptotics of oscillatory integrals and in solutions of diffraction theory problems.

This volume contains the new achievements in all these domains, to which one should add computer vision theory, where these results also get interesting interpretations.

Vladimir Arnol'd

the 23rd of October, 1998

CONTENTS

S. S. ANISOV, Integral formulas related to wave fronts	11–17
C. BAINES, The multiplicity of the Lyashko-Looijenga mapping on the discriminant strata of even and odd polynomials	19–40
N. BENSALÉM and F. PELLETIER, Some geometrical properties of infinite dimensional bilinear controlled systems	41–59
I. A. BOGAEVSKI, Singularities of convex hulls as fronts of Legendre varieties	61–74
A. A. DAVYDOV and V. M. ZAKALYUKIN, Classification of relative minima singularities	75–90
P. J. GIBLIN and P. A. HOLTOM, The centre symmetry set	91–105
V. V. GORYUNOV and J. W. HILL, Finite-type invariants of Legendrian knots in the 3-space: Maslov index as an order 1 invariant	107–122
G. ISHIKAWA, Determinacy, transversality and Lagrange stability	123–135
S. IZUMIYA, H. KATSUMI and T. YAMASAKI, The rectifying developable and the spherical Darboux image of a space curve	137–149
S. JANECZKO, Invariant properties of the generalized canonical mappings	151–161
P. JAWORSKI, On the uniqueness of the quasihomogeneity	163–167
A. JOETS, Topology and geometry of caustics in relation with experiments ...	169–177
B. KRUGLIKOV, Classification of Monge-Ampère equations with two variables	179–194
M. MIKOSZ, Secondary characteristic classes for the isotropic Grassmannian .	195–204
T. NISHIMURA, Recognizing right-left equivalence locally	205–215
I. R. PORTEOUS, Some remarks on duality in S^3	217–226
T. SANO, Bifurcations of affine invariants for one-parameter family of generic convex plane curves	227–236
V. SEDYKH, On some classes of curves in a projective space	237–266
D. SIERSMA, Properties of conflict sets in the plane	267–276
J. SOTOMAYOR, D. SIERSMA and R. GARCIA, Curvatures of conflict surfaces in Euclidean 3-space	277–285
S. TANABÉ, On geometry of fronts in wave propagations	287–304
A. VOLFORD, P. L. SIMON and H. FARKAS, Waves of excitations in heterogeneous annular region, asymmetric arrangement	305–320