Preface

This book has traveled strange. It began with an idea to provide a presentation of classical differential geometry that was as sufficiently complete and as rigorous as possible.

In principle, it was addressed to students or postgraduate students who are interested in the applications of differential geometry. This was fulfilled to a great extent, but two other powerful processes were in action simultaneously.

The first one, in a loose sense, was the economic crisis, which affected not only the financing of science in general, but also the level of training of students.

The second one was the parallel accumulation of many interesting results obtained in collaboration with our colleagues Vassil Vassilev, Peter Djondjorov, Vladimir Pulov, Borislav Angelov, Peter Chernev, Petko Marinov, Elena Popova, Jean-Francois Ganghoffer (Nancy, France), John Oprea (Cleveland, USA), and Jan Sławianowski (Warsaw, Poland). It is our pleasant duty here to express our gratitude for the cooperation we have enjoyed for so many years.

A part of these results was presented from a unified point of view in the Ph.D. thesis of the second author, defended in July 2012. At that time, it was decided that it should be expanded in the form of a book. Unfortunately, due to their administrative duties, our main co-authors (V. Vassilev and P. Djondjorov) could not take part in this new project.

The exposition itself is based on the natural mathematical framework which embraces the results mentioned above. Namely, the equation $\dot{\kappa}^2 = P_4(\kappa)$, where κ is the curvature of the plane curve and $P_4(\kappa)$ is a fourth-degree polynomial with real coefficients.

This polynomial appears in the most general case in considerations related to the shape of elastic cylindrical membranes under pressure, and the corresponding

equation is accordingly called the equation of the generalized elasticas. It turns out that under the proper light, many other problems can be viewed as generalized elasticas. From this follows the book's title.

The reader has to decide for himself if we have succeeded in pursuing this aim.

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