

Berichte aus der Mathematik

**Franki Dillen,  
Ignace Van de Woestyne (Eds.)**

**Pure and Applied Differential Geometry  
PADGE 2007**

Shaker Verlag  
Aachen 2007

**Bibliographic information published by the Deutsche Nationalbibliothek**

The Deutsche Nationalbibliothek lists this publication in the Deutsche Nationalbibliografie; detailed bibliographic data are available in the Internet at <http://dnb.d-nb.de>.

Copyright Shaker Verlag 2007

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system, or transmitted, in any form or by any means, electronic, mechanical, photocopying, recording or otherwise, without the prior permission of the publishers.

Printed in Germany.

ISBN 978-3-8322-6759-9

ISSN 0945-0882

Shaker Verlag GmbH • P.O. BOX 101818 • D-52018 Aachen

Phone: 0049/2407/9596-0 • Telefax: 0049/2407/9596-9

Internet: [www.shaker.de](http://www.shaker.de) • e-mail: [info@shaker.de](mailto:info@shaker.de)

# Pure and Applied Differential Geometry PADGE 2007

Franki Dillen, Ignace Van de Woestyne \*

## Contents

<b>Lorentzian Homogeneous Manifolds with Completely Reducible Isotropy</b>	<b>7</b>
<i>Dmitri V. Alekseevsky</i>	
<b>Rotational Willmore Surfaces in <math>\mathbb{L}^3</math> and Solitons in the 2-dimensional <math>O_1(3)</math> Nonlinear Sigma Model</b>	<b>14</b>
<i>Magdalena Caballero</i>	
<b>On the Geometry of <math>g</math>-natural Contact Metric Structures on the Unit Tangent Sphere Bundle</b>	<b>23</b>
<i>Giovanni Calvaruso</i>	
<b>Chen's Inequalities in Generalized Space Forms</b>	<b>32</b>
<i>Alfonso Carriazo</i>	
<b>Minimal Surfaces in <math>\mathbb{S}^2 \times \mathbb{S}^2</math></b>	<b>39</b>
<i>Idefonso Castro</i>	
<b>Classifications of Dupin Hypersurfaces</b>	<b>48</b>
<i>Thomas E. Cecil, Quo-Shin Chi and Gary R. Jensen</i>	
<b>Ricci Curvature, Hausdorff Distance and Almost Solvability of Fundamental Groups</b>	<b>57</b>
<i>Wen-Haw Chen</i>	
<b>Global Properties of Indefinite Metrics with Parallel Weyl Tensor</b>	<b>63</b>
<i>Andrzej Derdzinski and Witold Roter</i>	
<b>On Walker Type Identities</b>	<b>73</b>
<i>Ryszard Deszcz and Makoto Yawata</i>	

---

\*With the support of the Research Foundation Flanders FWO

<b>Remarks on an Inequality involving the Normal Scalar Curvature</b>	<b>83</b>
<i>Franki Dillen, Johan Fastenakels and Joeri Van der Veken</i>	
<b>Inequalities of Oprea</b>	<b>93</b>
<i>Johan Fastenakels</i>	
<b>On the Shape of the Cubic Bézier Curve</b>	<b>98</b>
<i>Georgi H. Georgiev</i>	
<b>Ideal Contact Slant Submanifolds</b>	<b>107</b>
<i>Valentin Ghişoiu</i>	
<b>On Roter Type Manifolds</b>	<b>114</b>
<i>Małgorzata Głogowska</i>	
<b>Translation Surfaces with Vanishing Second Gaussian Curvature in Euclidean and Minkowski 3-Space</b>	<b>123</b>
<i>Wendy Goemans and Ignace Van de Woestyne</i>	
<b>Semi-Riemannian Approach to Nonimaging Optics</b>	<b>132</b>
<i>Manuel Gutiérrez</i>	
<b>A Geometric Characterization from Triple Systems</b>	<b>140</b>
<i>Noriaki Kamiya</i>	
<b>Image Space</b>	<b>149</b>
<i>Jan Koenderink</i>	
<b>“Combined Manifolds” and Duality</b>	<b>158</b>
<i>Gregory L. Light</i>	
<b>Parabolic Surfaces in Hyperbolic Space with Constant Curvature</b>	<b>162</b>
<i>Rafael López</i>	
<b>Scalar Normal Curvature of Lagrangian 3-dimensional Submanifolds in Complex Space Forms</b>	<b>171</b>
<i>Adela Mihai</i>	
<b>Quasi-Minimal Slant Surfaces in Lorentzian Complex Space Forms</b>	<b>178</b>
<i>Ion Mihai</i>	
<b>Surfaces in <math>\mathbb{H}^+ \times \mathbb{R}</math></b>	<b>185</b>
<i>Franki Dillen and Marian Ioan Munteanu</i>	
<b>Rotational Surfaces in Lorentz-Minkowski Space</b>	<b>194</b>
<i>Miguel Ortega</i>	
<b>Darboux Transformations: From Elastic Curves to Elastic Surfaces and Beyond</b>	<b>203</b>
<i>G. Paul Peters</i>	

<b>Curvature and Holonomy of a Connection in an Arbitrary Fibre Bundle</b>	<b>212</b>
<i>Helmut Reckziegel and Eva Wilhelmus</i>	
<b>Bochner-Lichnerowicz's Technique and Uniqueness of Constant Mean Curvature Spacelike Hypersurfaces</b>	<b>221</b>
<i>Alfonso Romero</i>	
<b>Recent Results On Hypersurfaces in <math>CP^2</math> and <math>CH^2</math></b>	<b>231</b>
<i>Patrick J. Ryan</i>	
<b>Non-Euclidean Method of the Generalized Geometry Construction</b>	<b>238</b>
<i>Yuri A. Rylov</i>	
<b>On Flexible Flat Tori in <math>S^3</math></b>	<b>247</b>
<i>Idzhad Kh. Sabitov</i>	
<b>Curvature Identities On Hypersurfaces in Spaces of Constant Curvature</b>	<b>252</b>
<i>Katarzyna Sawicz</i>	
<b>Marginally Trapped Surfaces in Lorentzian Space Forms</b>	<b>261</b>
<i>Joeri Van der Veken</i>	



## Preface

From April 10<sup>th</sup> till April 13<sup>th</sup> 2007, the International Congress on Pure and Applied Differential Geometry PADGE 2007 was held in Brussels, Belgium. This congress was a joint initiative of the K.U.Brussel (Katholieke Universiteit Brussel), the K.U.Leuven (Katholieke Universiteit Leuven) and the EHSAL (European University College Brussels). The congress covered topics in Riemannian geometry, Lorentzian geometry and applications to relativity, submanifolds of Riemannian and Lorentzian spaces and visualization. This book contains the proceedings of PADGE 2007.

On behalf of the organizers, firstly, we would like to thank all participants. They responded enthusiastically and in large numbers, considering the highly specialized topics covered by the congress. Thanks to their very interesting contributions through presentations, posters and discussions, the congress can be considered a great success.

Organizing an international congress is not possible without financial support. So we truly thank the Research Foundation Flanders FWO and the EHSAL for their financial support. Also many thanks to the EHSAL for letting us use their multimedia rooms and the accommodating technical support.

We also would like to express our thanks to the other members of the organizing and scientific committee Stefan Haesen, Udo Simon, Barbara Opozda, Leopold Verstraelen, Luc Vrancken and Johan Walrave for their work behind the scenes. Their suggestions for keynote speakers, screening of abstracts and their constructive input have been crucial for meeting the high international scientific standards.

Together with several local people, we put in great efforts to create the optimal conditions for the emergence of new ideas and the exchange of knowledge between researchers. From the numerous positive reactions we received afterwards, we conclude that we indeed achieved this goal. So with these proceedings, the organization of PADGE 2007 comes to an end. We are convinced that this book, which reflects current scientific research, is not only a memory to the congress, but especially a source of knowledge that contributes to the exploration of the field of differential geometry.

Franki Dillen  
Ignace Van de Woestyne

