## **Surveys in Differential Geometry**

- Vol. 1: Lectures given in 1990, edited by S.-T. Yau and H. Blaine Lawson
- **Vol. 2:** Lectures given in 1993, edited by C.C. Hsiung and S.-T. Yau
- **Vol. 3:** Lectures given in 1996, edited by C.C. Hsiung and S.-T. Yau
- Vol. 4: Integrable systems, edited by Chuu Lian Terng and Karen Uhlenbeck
- **Vol. 5:** Differential geometry inspired by string theory, *edited by S.-T. Yau*
- **Vol. 6:** Essays on Einstein manifolds, edited by Claude LeBrun and McKenzie Wang
- Vol. 7: Papers dedicated to Atiyah, Bott, Hirzebruch, and Singer
- Vol. 8: Papers in honor of Calabi, Lawson, Siu, and Uhlenbeck
- **Vol. 9:** Eigenvalues of Laplacians and other geometric operators, *edited by A. Grigor'yan and S.-T. Yau*
- Vol. 10: Essays in geometry in memory of S.S. Chern, *edited by S.-T. Yau*
- **Vol. 11:** Metric and comparison geometry, edited by Jeffrey Cheeger and Karsten Grove
- **Vol. 12:** Geometric flows, edited by Huai-Dong Cao and S.-T. Yau

Volume X

## Surveys in Differential Geometry

Essays in geometry in memory of S.S. Chern

> edited by Shing-Tung Yau



Surveys in Differential Geometry, Vol. 10

International Press P.O. Box 43502 Somerville, MA 02143 www.intlpress.com

Copyright © 2006, 2008 by International Press

2000 Mathematics Subject Classification. 03-02

All rights reserved. No part of this work can be reproduced in any form, electronic or mechanical, recording, or by any information storage and data retrieval system, without prior approval from International Press. Requests for reproduction for scientific and/or educational purposes will normally be granted free of charge. In those cases where the author has retained copyright, requests for permission to use or reproduce any material should be addressed directly to the author.

Essays in geometry in memory of S.S. Chern Shing-Tung Yau, editor

ISBN 978-1-57146-122-3

Originally published in 2006 under ISBN 978-1-57146-116-2. This larger-format reissue includes a correction to the table of contents, a revised preface, and an updated series listing at the front of the book.

Typeset using the LaTeX system. Printed in the USA on acid-free paper.



Shiing-Shen Chern 1911 - 2004

## Preface

A venerated leader in the field of geometry and a beloved teacher, Professor Shiing-Shen Chern passed away in 2004, at the age of 93.

In the spring of 2005, the Journal of Differential Geometry Conference, held annually at Harvard University, was dedicated in his honor, and attended by many of his friends, his former students, and even his son, who came from far away to be present at the conference. There were several talks related to his lifelong work in geometry and topology, as well as lectures given on new contributions to these fields.

The conference was a great success, and Professor Chern would have loved to see most of his students and friends gathered in memory of him.

## Contents

On the space-time monopole equation Bo Dai, Chuu-Lian Terng, and Karen Uhlenbeck	1
The Ehrhart function for symbols Victor W. Guillemin, Shlomo Sternberg, and Jonathan Weitsman	31
Recent results on the moduli space of Riemann surfaces Kefeng Liu	43
Applications of minimal surfaces to the topology of three- manifolds William H. Meeks, III	95
An integral equation for spacetime curvature in general relativity Vincent Moncrief	109
<b>Topological strings and their physical applications</b> Andrew Neitzke and Cumrun Vafa	147
Notes on GIT and symplectic reduction for bundles and varieties R.P. Thomas	221
Perspectives on geometric analysis Shing-Tung Yau	275
Distributions in algebraic dynamics Shou-Wu Zhang	381