**Zeitschrift:** L'Enseignement Mathématique
**Herausgeber:** Commission Internationale de l'Enseignement Mathématique
**Band:** 48 (2002)
**Heft:** 1-2: L'ENSEIGNEMENT MATHÉMATIQUE

**Artikel:** HOLONOMY AND SUBMANIFOLD GEOMETRY
**Autor:** Console, Sergio / Di Scala, Antonio J. / Olmos, Carlos
**Kurzfassung**
**DOI:** https://doi.org/10.5169/seals-66066

**Nutzungsbedingungen**
Die ETH-Bibliothek ist die Anbieterin der digitalisierten Zeitschriften auf E-Periodica. Sie besitzt keine Urheberrechte an den Zeitschriften und ist nicht verantwortlich für deren Inhalte. Die Rechte liegen in der Regel bei den Herausgebern beziehungsweise den externen Rechteinhabern. Das Veröffentlichen von Bildern in Print- und Online-Publikationen sowie auf Social Media-Kanälen oder Webseiten ist nur mit vorheriger Genehmigung der Rechteinhaber erlaubt. Mehr erfahren

**Conditions d'utilisation**
L'ETH Library est le fournisseur des revues numérisées. Elle ne détient aucun droit d'auteur sur les revues et n'est pas responsable de leur contenu. En règle générale, les droits sont détenus par les éditeurs ou les détenteurs de droits externes. La reproduction d'images dans des publications imprimées ou en ligne ainsi que sur des canaux de médias sociaux ou des sites web n'est autorisée qu'avec l'accord préalable des détenteurs des droits. En savoir plus

**Terms of use**
The ETH Library is the provider of the digitised journals. It does not own any copyrights to the journals and is not responsible for their content. The rights usually lie with the publishers or the external rights holders. Publishing images in print and online publications, as well as on social media channels or websites, is only permitted with the prior consent of the rights holders. Find out more

**Download PDF:** 17.04.2026

**ETH-Bibliothek Zürich, E-Periodica, https://www.e-periodica.ch**

*L'Enseignement Mathématique, t. 48 (2002), p. 23–50*

# HOLONOMY AND SUBMANIFOLD GEOMETRY

by Sergio CONSOLE, Antonio J. DI SCALA and Carlos OLMOS [1])

ABSTRACT. We survey some applications of holonomic methods to the study of submanifold geometry, showing the consequences of some sort of extrinsic version of the de Rham Decomposition Theorem and of Berger's Theorem: the so-called *Normal Holonomy Theorem*. At the same time, from geometric methods in submanifold theory we sketch some very strong applications to the holonomy of Lorentzian manifolds. Moreover we give a conceptual modern proof of a result of Kostant for homogeneous spaces.

## 1. INTRODUCTION

A connection on a connected Riemannian manifold $M$ can be interpreted as a way of comparing tangent spaces at different points, by means of parallel transport.

The parallel translation depends, in general, on the curve joining two points and this dependence is measured by the *holonomy group*, i.e. the linear group of isometries obtained by parallel transporting along based loops.

Actually holonomy groups can be defined for any connection on a vector bundle. For example, in this note we will be particularly interested in the holonomy group of the normal connection, called *normal holonomy group*.

Holonomy plays an important role in (intrinsic) Riemannian geometry, in the context of special Riemannian metrics, e.g., symmetric, Kähler, hyperkähler and quaternionic Kähler metrics.

The main purpose of this note is to survey the application of holonomic methods to the study of submanifold geometry and vice versa. Namely, we will sketch some very strong applications of geometric methods in submanifold

[1]) Research supported by Univ. Nac. de Córdoba, CONICET, CONICOR, Secyt-UNC, ANPCyT and CIEM, Università di Torino, MURST and CNR of Italy.