

On the Obstructions to Non-Cliffordian Pin Structures

Andrew Chamblin

Department of Applied Maths and Theoretical Physics, University of Cambridge, Cambridge CB3 9EW, England

Received: 1 July 1993

Abstract: We derive the topological obstructions to the existence of non-Cliffordian pin structures on four-dimensional spacetimes. We apply these obstructions to the study of non-Cliffordian pin-Lorentz cobordism. We note that our method of derivation applies equally well in any dimension and in any signature, and we present a general format for calculating obstructions in these situations. Finally, we interpret the breakdown of pin structure and discuss the relevance of this to aspects of physics.m

Contents

I. Introduction	65
II. Discussion of Sheaf Theory	68
III. Derivation of the Obstructions to Non-Cliffordian Pin Structure	71
IV. Applications of the Obstructions to Pin-Lorentz Cobordism	76
V. Interpreting the Breakdown of Pin Structure	79
VI. Format for Solving the General Problem	84
VII. Conclusion	84
Acknowledgements	85
References	85

I. Introduction

Suppose we are given a manifold, M , with tangent bundle τ_M which can be reduced to a bundle with structure group “ O ” say. Then one of the first things we might notice is that we generally have $\pi_1(O) \simeq G \not\cong \{1\}$. What this means is that at a point $p \in M$ there exist paths $O_1, O_2 \in O$, which might act on the fibre $\tau_M|_p$ “equivalently” (in the sense that, for $x \in \tau_M|_p, O_1(x) = O_2(x)$), but with the property that