L^2 REIDEMEISTER FRANZ TORSION

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INTRODUCTION

In this paper we discuss an approach to the study of closed, connected, oriented manifolds, with infinite fundamental group which have a special property which we call L^2-acyclicity. The first object of our exposition is to summarise in an accessible form what we have established about such manifolds in [2]. As a result of discussions on this work which occurred during the conference we attempted to prove some new results and these are included in Section 4.

The main object of the first three sections is to introduce the definition of a new differential invariant of an L^2-acyclic manifold (as in [2]) called L^2-RF torsion. The theory of finite von Neumann algebras is an essential ingredient in the definition.

The new results in the final section enable us to compute the L^2-RF torsion for more L^2-acyclic manifolds.

To indicate why this study should have some general interest we begin with a conjecture which is suggested by our research.

CONJECTURE: *Let M be an odd dimensional, closed, connected, oriented manifold of negative sectional curvature. Then M is an L^2 acyclic manifold.*

The evidence for this conjecture is based on the following: Using the results of Donnelly and Xavier [9] and Dodzuik [8], it can be shown that if M is an odd dimensional, closed, connected, oriented manifold, with negative sectional curvature pinched between two sufficiently close negative constants, then M is an L^2-acyclic manifold.

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1. SOME ALGEBRA & THE FUGLEDE-KADISON DETERMINANT

Let π be a discrete group and $\ell^2(\pi)$ be the Hilbert space of square summable