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On the spectrum of the Laplacian in cosymplectic manifolds*

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§1. Introduction

Let (M,g) be an m-dimensional compact orientable Riemannian manifold (connected and C^{∞}) with metric tensor g. We denote by Δ the Laplacian acting on p-forms on M, $0 \leq p \leq m$. Then we have the spectrum for each p:

$$Spec^{P}(M,g) := \{0 \leq \lambda_{0,p} \leq \lambda_{1,p} \leq \lambda_{2,p} \leq \cdots \uparrow +\infty\},$$

where each eigenvalue $\lambda_{\alpha,p}$ is repeated as many times as its multiplicity indicates. In order to study the relation between $Spec^{p}(M,g)$ and the geometry of (M,g) we use the Minakshisundaram - Pleijel - Gaffney's formula. Z. Olszak ([10]), H.K. Pak ([11]), J.S. Pak, J.C. Jeong and W-T. Kim ([12]), S. Yamaguchi and G. Chūman ([18]) and others studied the spectrum of the Laplacian and the curvature of Sasakian manifolds.

The purpose of the present paper is to study cosymplectic analogues for certain results of [1], [10], [12], [13], [14], [15] and [18].

We shall be in C^{∞}-category. The indices $h, i, j, k, s, t, \cdots$ run over the range $\{1, 2, \cdots, 2n+1\}$. The Einstein summation convention with respect to those system of indices will be used.

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§2. Preliminaries

By $R = (R_{kji}{}^{h}), R_1 = (R_{ji})$ and r we denote the Riemannian curvature tensor, the Ricci curvature tensor and the scalar curvature, respectively.

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